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1910

# The Deep Waterway

Between the Great Lakes  
and the Gulf of Mexico

*Development of the Deep Waterway in Relation  
to Conservation*



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Book .2  
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# The Lakes-to-the-Gulf Deep Waterway Association



Headquarters, 914 New Bank of Commerce Building  
SAINT LOUIS, MO.

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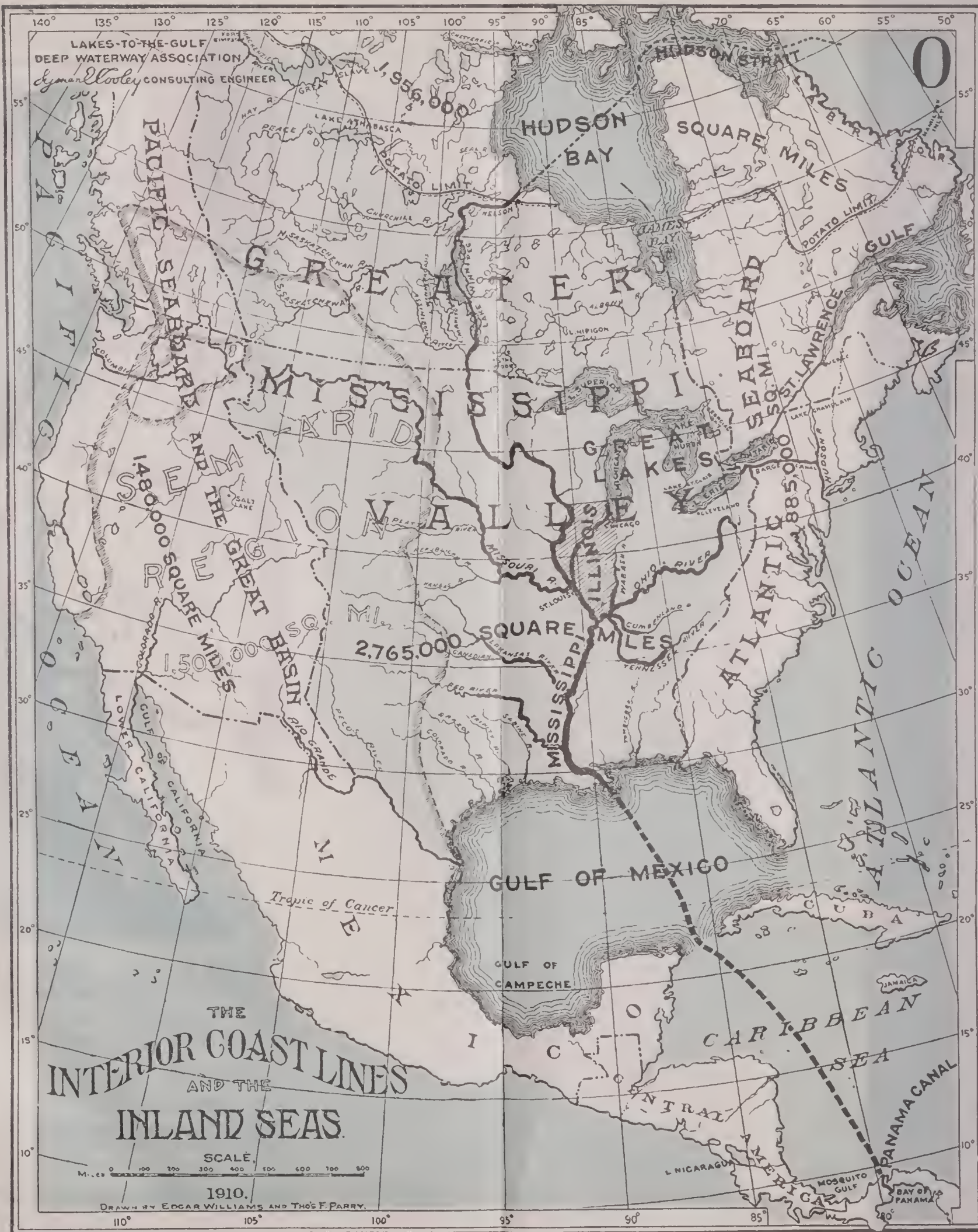
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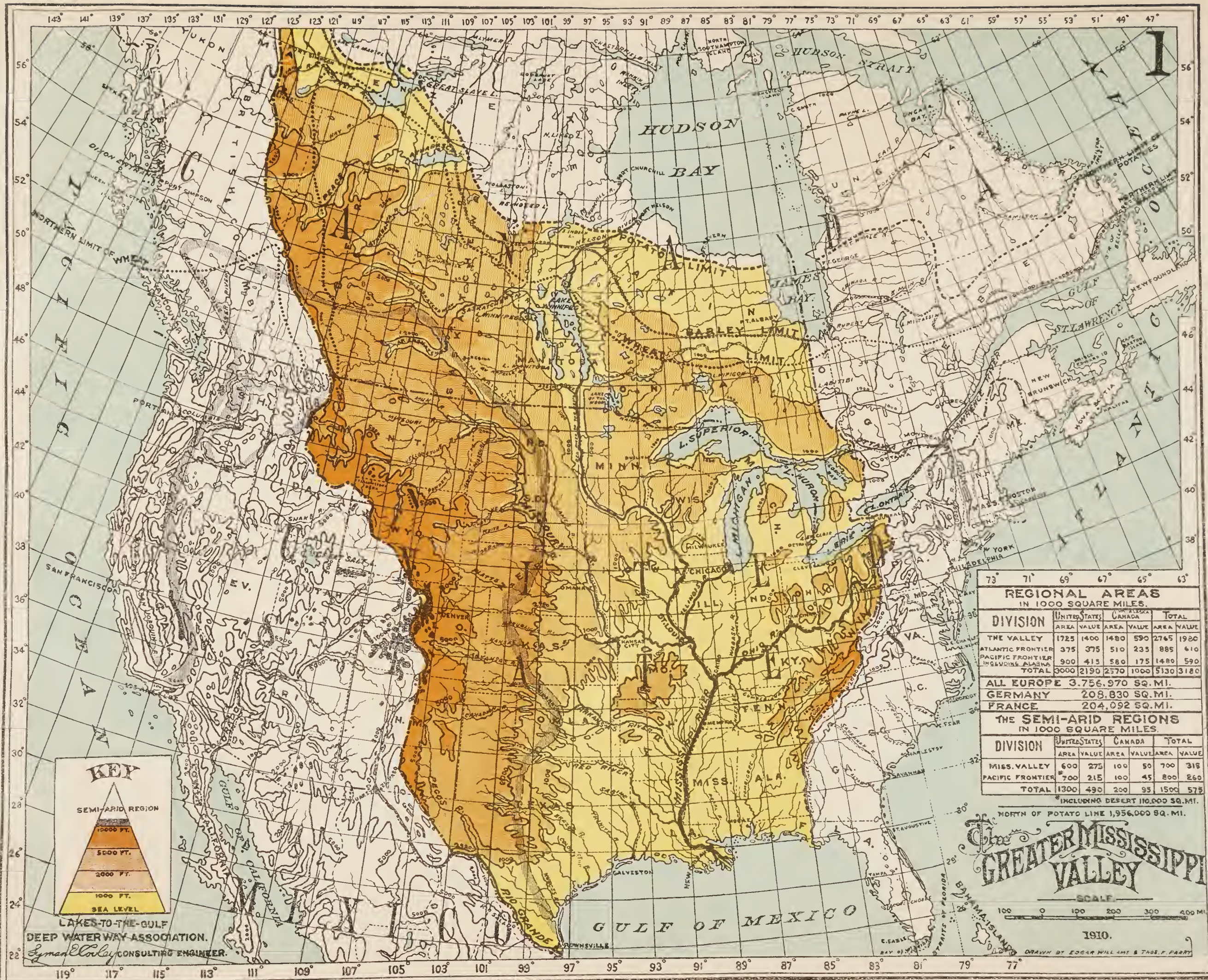




THE  
EQUAL IN POTENTIAL  
TO  
FRANCE OR GERMANY

THE RAIL REVENUE ACTING PRESIDENT









# AN ADDRESS

By LYMAN E. COOLEY *of Chicago*

CONSULTING ENGINEER LAKES-TO-THE-GULF DEEP  
WATERWAY ASSOCIATION

ST. LOUIS CONVENTION, NOVEMBER 26, 1910.

I am here, not to make a formal address, but to give you a running talk on nine exhibits which were prepared by order of the officers of the Lakes-to-the-Gulf Deep Waterway Association in order to illustrate their cause before the committees of Congress.

In presenting the matter to the House Committee on January 28 it took five hours to cover the subject. This was not because I had so much to say, but because the exhibits had so much to say. The effect was hypnotizing, paralyzing or otherwise, for the committee unanimously reported in favor of our proposition and it passed the House by practically a unanimous vote.

On February 28 the same program was carried out in the Senate, but it took only four and a half hours to cover the matter, and the Senate Committee and the Senate, with one dissenting vote, approved our program and passed it up to the President of the United States, and Senator Bourne of Oregon remarked that if we didn't get what we wanted it was because we did not ask for it.

I then presented these exhibits on April 7 for an hour and a half before the Executive of the United States in the White House; but it was five months later, September 7, when he felt called upon to act, and by that time he had forgotten which side of the question I was on.

This map, No. 1, is large enough for a committee room, but hardly large enough for this audience to see well, so I will describe it a little more fully. It represents the Continent of North America, between the Gulf of Mexico and the Republic of Mexico, and the northern limit at which wheat, barley and potatoes will ripen. *Upon this Continent, within these limits, we have 5,130,000 square miles, of*



*which 2,765,000 square miles lie in the greater Mississippi Valley, extending from the Gulf of Mexico to the potato, wheat and barley limit on the north and the Rocky Mountains on the west and the Allegheny Mountains and the Niagara frontier, and James and Hudson Bay on the east.*

A study of the economic potential of this Continent, the arable resources, the soil capacity, or, in other words, the capacity for carrying population, was made by me some eight or ten years ago in an official capacity, with the aid of a considerable corps of assistants. We undertook to put the economic value on all the soil resources in the United States and British North America, making due allowance for the partial value of about 1,500,000 square miles of semi-arid territory, the high sterile regions and the rocky areas, and for the fringing out in value toward the potato and barley limit on the north. We estimated the potential of the greater Mississippi Valley at 1,980,000 out of a total area of 2,765,000 square miles, which is an area almost as great as the whole of Europe. This is the greatest single estate for the habitation of man laid out on this globe. Take this area of some two million square miles, the economic value of the valley, and it is equal to ten countries like France or ten countries like Germany. On the basis of the population in France it would carry over four hundred million people. On the basis of the population in Germany it would carry over six hundred million; on the basis of the population as it exists in parts of China and India it would carry over one billion people. In other words, it is capable of carrying comfortably all the people in the world today. That is what the Mississippi Valley means. (Applause.)

This greater Mississippi Valley represents over five-eighths of the economic value of the entire Continent north of Mexico and south of the barley and potato limits. The aggregate value is 3,140,000 square miles, of which 610,000 square miles lie on the Atlantic frontier and 550,000 square miles on the Pacific frontier, so that nearly two-thirds of the potential value of the Continent for carrying population lies within the valley limits. The proportion in Canada is about 30 per cent of the total; in other words, within the valley Canada would have three areas equal in potential to either

France or Germany; the United States would have seven areas equal in potential to either France or Germany; and the total value of the Continent north of Mexico would be about sixteen areas equal to France and Germany. Some five eighths of the resources of this Continent lie in the Mississippi Valley; less than one-fifth of the total lies east of the Alleghenies; less than one-fifth lies west of the Rockies—the whole being equivalent to about sixteen nations like France or Germany. *If you set off on the Gulf border two nations the equivalent of either France or Germany, you will have in the interior of this Continent, land-locked and remote from the sea, the potential of eight nations like France or Germany.*

*What does this mean? These areas are far from the seaboard and solely dependent on railway and land transportation. They cannot compete or hope to develop their resources in competition with the more favored nations. Every important country in Europe except one has the sea on two borders, the land hauls are short, and the rivers are improved and find the sea in a short distance. Here you have areas a thousand miles from the sea. Take Illinois, Iowa, Minnesota and Wisconsin—the area is greater than France or Germany, with possibilities greater than either of those countries. They can carry more population, they have more resources. Sit down and figure out, as an economic proposition, what is required of a railway system—the domestic work of this area, the relation with neighboring areas, and the connection with the seaboard and the outside world—and then you will have an investment in railway transportation of two and a half to three times what this unit area would require if bordered by the sea, with its rivers improved like France or Germany. You cannot maintain or even develop the potential value of the interior of this Continent in competition with the more favored nations of the world on such a basis. It is land-locked. You cannot take them down to the sea, these interior areas or units, but you can, for all practical purposes, bring the sea to their doors. (Applause.)*

On this map, if you follow it in detail, you will see the horizon of one thousand feet elevation, covering the great alluvial areas, the lower levels of the Continent, running through from the Gulf of Mexico to Hudson Bay and the Gulf of Saint Lawrence, more than a

million square miles. You will see also a 2,000-foot, a 5,000-foot and a 10,000-foot horizon. The arid regions are generally above the 2,000-foot level, largely at the 5,000-foot level, the high steppe lands. The lowest valley line crosses northeasterly out by way of the Great Lakes to the Gulf of Saint Lawrence, with a summit elevation at Chicago under 600 feet. The lowest line northerly reaches to Hudson Bay by way of the Minnesota River, the Red River of the North and Lake Winnipeg, with a summit elevation of 960 feet, between Minnesota and the Dakotas. Along these base lines will be developed, in the fulness of time, the greatest waterway for ships. When this is done, all the waterways between the two mountain chains and from the Gulf to the frozen zone, will be tributary to these base lines. Each unit area can then develop on its individual merits, just as do the little States in Europe within their narrow confines, and each unit will be in the position of the most favored nation, with its frontier seaboard as effective as an actual seaboard, and even more effective. The Atlantic seaboard soon develops with rugged territory back to the mountains, and the Pacific seaboard is also rugged, mountainous, and largely semi-arid, while back from these interior coast lines is the richest hinterland in the world, capable of carrying the densest population.

*The point of view that I am trying to present here is that we should develop those possibilities to the limit of the physical conditions, that no man should be permitted to make his mental limitations a measure for the future. No man can undertake to forecast the destiny of this Continent, but we can measure the physical conditions and so plan that development may go on progressively and ultimately meet all of the demands and provide for all the possibilities that I have called to your attention. (Applause.)*

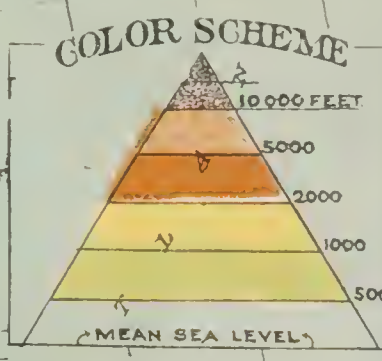
Exhibit No. 2 is a topographical map of the United States. It is painted in colors to show horizons and elevations—the seashore margin rising to 100 feet, the next color to 500 feet, the next to 1,000 feet, and then to 2,000 feet, then 5,000 feet and 10,000 feet. I will be very brief with this. If we had time we could go into it at great length and instructively. If you study that map closely you will see the lowlands, less than 500 feet in altitude, extending up to within





LAKES-TO-THE-GULF  
DEEP WATERWAY  
ASSOCIATION.  
*Symon Kosley* CONSULTING ENGINEER.

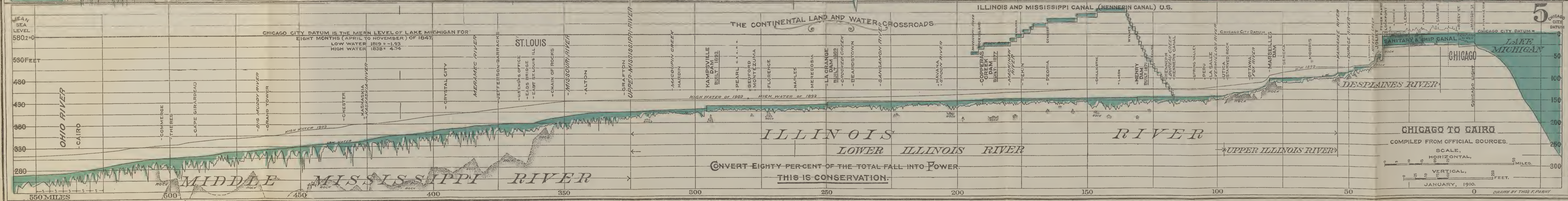
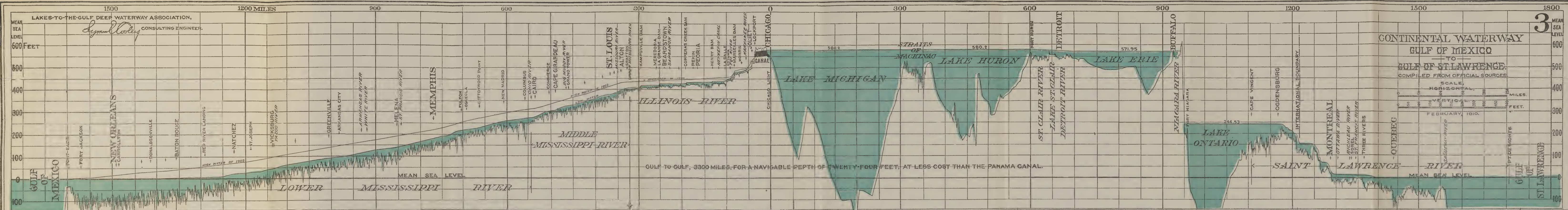
**TOPOGRAPHY**  
OF THE  
**UNITED STATES OF AMERICA.**  
SCALE. 0 100 200 300 400 500 MILES  
1910.  
BASE MAP BY U.S. GEOLOGICAL SURVEY. DRAWN BY THOS. F. PARRY.

















forty miles of the city of Chicago. A 600-foot horizon would go through to the Gulf of Saint Lawrence. On the east the only place where the 500-foot color reaches through is the Mohawk Valley from Lake Ontario. If you look along the Allegheny Mountains you will see the drab colors up to 2,000 feet, so there is no route for a waterway there except around by the north or away south by Georgia. On the west you have the high altitudes shown in the grays. If you draw a line north and south dividing the United States into equal parts, one and a half million square miles east and one and a half million square miles west, the line of division is practically on the semi-arid line, which coincides substantially with the 2,000-foot contour of elevation. Taking the economic value of the United States east of this line at one and a half million square miles, the west may be taken at six hundred and fifty thousand square miles, or about forty per cent of its area; so the economic value of the western half is only a fraction of the eastern half. There are no important waterways in the western half except two—the Columbia River running west and the Missouri River to the east. I have put on a heavy line, which only a few of you can see at this distance, showing the route from the Gulf to the Lakes and out through the Saint Lawrence. Now, seven of these unit areas of which we have spoken lie in the Mississippi Valley south of the international boundary, and five of them are land-locked, and the total equivalent in the United States is eleven areas like France or Germany, two on each seaboard and seven in the Mississippi Valley.

Gentlemen, this third exhibit (pointing to map) shows the profile from the Gulf of Mexico to the Gulf of Saint Lawrence, by way of the Great Lakes, a distance of 3,300 miles. Following up this line, we have New Orleans, Red River, Natchez, Vicksburg, Memphis, Cairo and the Ohio River, St. Louis and the Missouri River; then the Illinois River, and then we climb by the Upper Illinois to the Drainage Canal, a little steep declivity there, and then by the Drainage Canal to Chicago and Lake Michigan, then through Lake Huron, Lake Erie, Lake Ontario, down the Saint Lawrence by Montreal and Quebec, and then out to the Gulf. Chicago is practically at the midway point, 1,700 miles from the Gulf of Saint Lawrence and

1,600 miles from the Gulf of Mexico, and its altitude, *i. e.*, low water in Lake Michigan, is 580 feet above sea level. That altitude is less than the height of the Washington Monument at the National Capital. You have buildings in St. Louis rising above the level of the Chicago divide. This route was used by the explorers and fur traders from the beginning, and from early times was considered the line of domain which the French and Spanish tried to retain.

Even in the treaty of partition between Great Britain and the United States, following the Revolution, we had short-sighted people east of the Allegheny Mountains—some of their descendants are there yet—who were willing that the western boundary of the colonies should be fixed at the Allegheny Mountains, and it was only the genius of Ben Franklin and the intrigues of the French and Spanish courts which brought Great Britain finally to the idea that she must let the colonies have the land west to the Mississippi in order to protect herself. You ought to call this area west of the Alleghenies the Franklin Annex. Only one man east of the Alleghenies really understood the potential of the west.

On this profile is a legend, and I have been carrying a chip on my shoulder for over a year on account of it, waiting for somebody to call me. It states that twenty-four feet of water can be had from the Gulf of Mexico to the Gulf of Saint Lawrence, 3,300 miles, for less than the cost of the Panama Canal. (Applause.)

I stated that before the House Committee, and I have stated it over and over again, and I waited for somebody to pick me up, but nobody has opened his mouth. I stated it before the Senate Committee, and I stated it to the President of the United States. I stated it to the Board of Engineers, and I have stated it whenever I had an opportunity, and there is nobody who has taken issue with me yet. It is a fact. (Applause.)

I want to bring clearly before you, gentlemen, this proposition. We are in favor of the Isthmian Canal. Some of us had differences as to where and how it ought to be built, but the project itself we are all for. We want to see it completed. No one deprecates the expenditure, whether it is five hundred millions or less; but I want

THE OVERFLOW LINES AROUND THE DEEPER







29° 30° 31° 32° 33° 34° 35° 36° 37° 38° 39° 40° 41° 42° 43°

93° 92° 91° 90° 89° 88° 87° 86°

LAKE TO-THE-GULF DEEP WATERWAY ASSOCIATION,  
*Lyman Clowley* CONSULTING ENGINEER.

THE OVERFLOW LANDS ALONG THE DEEP WATERWAY, ARE FOURFOLD THE CULTIVATED AREA OF THE BEST DAYS OF EGYPT.  
THE REDEEMABLE ALLOUVIUM ALONG THE NAVIGABLE RIVERS AND THE GULF MARGIN EXCEEDS THE IRRIGABLE LANDS OF THE SEMI-ARID REGION.

THE  
MISSISSIPPI  
AND THE  
ALLUVIAL LANDS.

JANUARY, 1910.

OVERFLOW LANDS.

LOWER MISSISSIPPI,	PONCHARTRAIN BASIN, 2001	SQ. MI.
	ATCHAFALAYA	8109
	TENAS	5370
	YAZOO	6648
	ST. FRANCIS	7662
MIDDLE MISSISSIPPI,	CAIRO TO GRAFTON	740
ILLINOIS RIVER,	GRAFTON UP RIVER	691
	TOTAL OVERFLOW	31221 SQUARE MILES.

AUTHORITY.  
Mississippi River Commission 1899,  
Illinois State Geological Survey 1909-10.

SCALE.  
0 25 50 100 MILES.

DRAWN BY EDGAR WILLIAMS AND THOS F. FARRY.





to say that the value of the Panama Canal to this country is a bagatelle compared to this proposition of twenty-four feet of water from the Gulf of Saint Lawrence through the core of the Continent to the Gulf of Mexico. (Applause.)

Gentlemen, No. 4 is the Lakes-to-the-Gulf route from Chicago to the Gulf of Mexico. (Applause.) The route is a little longer than that map. (Laughter.) On that map you will find the valley from Chicago shown by the bluff lines, down to Cairo; and in blue colors below Cairo, you will find the alluvial lands that are subject to overflow, and it is to that feature particularly, aside from what you can see on the map, to which I wish to call your attention.

There are in the valley from Chicago to the Gulf of Mexico thirty-two thousand square miles of land, more than twenty million acres, subject to overflow. All but two or three thousand square miles of this land is south of Cairo in what is known as the delta region, and ninety million dollars of the estimate which has been made by the Board of Engineers are for revetments to hold the banks in order to conserve these lands and protect the levee system. When you take that out, less money is required to develop the Lakes-to-the-Gulf Deep Waterway than is required to develop the Ohio River for a depth of nine feet. (Applause.)

This empire of alluvium is right here. Some of our people are going to the far West, some are going up into Canada, hunting for lands, and we have them at our doors—the richest in the world. We have five thousand square miles of land in the State of Illinois that only require drainage or protection, an area greater than Connecticut, greater than Porto Rico—in Illinois alone. South of that we have this twenty million acres of land. There was never cultivated in the best days of the Pharaohs in all Egypt over five million acres of land. Here, under a climate as favorable, are four Egypts between Cairo and the Gulf. Egypt in her best days carried ten millions of population, as estimated by historians. By the same tokens this area will carry forty millions of people. Take the Gulf margins from Mobile to Galveston. There are several million acres of land that you can add to it, to be reclaimed from the Gulf. Go up these tributaries for a hundred miles and add their bottom lands and you will



have over thirty million acres. I submit to you the proposition that within these limits and on the margin of the Lakes-to-the-Gulf Waterway territory and in the broad ends of the tributary valleys, you have an extent of alluvial lands, subject to overflow, of greater intrinsic value than all the lands that can be reclaimed from the 1,300,000 square miles in the semi-arid region, estimated at fifty million acres. About six per cent of that great semi-arid area is all that is to be reclaimed or redeemed for agriculture. Here are these lands along these waterways and on the coast of the Gulf, which are to be redeemed, with soil nine to twenty feet deep, low-lying, with a mild climate, capable of producing all the products to which the climate is suited. That is what I wish to call to your attention.

Then there is the conservation side of the waterway question. This will enhance the value of these lands, they will become worth two hundred dollars an acre; we have lands in Illinois that are worth that, these rich alluvial lands, when they are brought under cultivation. This means one bit of real estate worth four billion dollars. This will develop the water power in Illinois, and along the Mississippi between St. Louis and Cairo, give you in time one million horsepower and four hundred million in value. The sanitary value in Chicago and the State of Illinois alone represent one hundred and fifty million dollars, the equivalent of any other treatment; you have also the sanitary redemption of all the lowlands. There are to be town sites and industries. You have in sight five billion in value at present prices, as a by-product of the waterways. If you choose to take the conservation side and forget about the waterway, you can produce all these values on their merits and have the waterway as a by-product. (Applause.)

Now take it on a different basis. Every alluvial acre of land on the Egyptian basis will carry two people. You can support forty million people on these lands that are to be redeemed through conservation. Look at the census and see what is the worth of a man in this country as a source of wealth—he will scale up about \$1,250 per head of population. That means fifty billions of dollars as the potential value, when you come to look at it as an ultimate resource for carrying population.

Exhibit 5 is the profile showing elevations along the water line by way of the Chicago Drainage Canal, the Illinois River, the Middle Mississippi River, from Lake Michigan to Cairo—the real problem of the Lakes-to-the-Gulf Waterway which we have to consider from an engineering standpoint. The part below Cairo belongs to the Ohio River as much as it belongs to us, and the improvement of that part, as I have tried to show you, is a problem of conservation. They talk about nine feet in the Lower Mississippi and they claim to have it now, with the modern hydraulic dredges and the regular annual expenditure. This proposed nine feet means nothing more than you have now. The holding of the banks on the Lower Mississippi River from Cairo to the Red River, is believed by every hydraulic engineer to produce automatically not less than fourteen feet, and by the greatest opponent of this project, Gen. Marshall, twenty feet is admitted as a probable result. So the production of a deep waterway from Cairo to the Gulf can be relied upon when the banks are protected, and when that is consummated it will produce fourteen feet or more, with some channel correction in localities across individual bars, and this means twenty-four feet for all but one hundred and twenty days of the average year. The next fellow—we don't undertake as engineers to say that the next fellow will not know as much as we do and a little more, will not have more resources—will be encouraged, if we have produced such results, to complete the job. Give him a chance.

This profile starts in at Lake Michigan. You see there the Chicago Drainage Canal across the divide, twenty-four feet deep, thirty-six miles long, and capable of carrying fourteen thousand cubic feet of water per second when it has been completed, *i. e.*, when the feeding channels from Lake Michigan have been developed. That volume is one-third of the standard low-water volume passing St. Louis and is seven times the low-water volume at St. Paul. That is the capacity of the Chicago Drainage Canal. At present they are sending through there officially and legally 30 per cent of this ultimate volume.

The next stretch below the Drainage Canal of sixty-one miles, and for which we have some larger maps that will appeal later, is the

rock-bound portion of the valley, the upper Illinois valley, covering the declivity of one hundred and forty-six feet between the end of the Drainage Canal and Utica, in which it is proposed to construct five locks and four intermediate pools.

From Utica to Grafton we have the alluvial division of the Illinois River, two hundred and thirty miles, with a declivity of only twenty-eight feet, hardly enough to encourage the water to run down hill. We have to make a deep channel in this river to keep the stream from filling up. It is now filling up, but if we can produce eighteen to twenty-four feet and fill it with a sufficient volume of water, we will make a strong current which will maintain the channel. That is one of the reasons for deep water through the Illinois valley, and anything short of that means perpetual maintenance.

*We now come to the middle Mississippi, from Grafton to Cairo, and that has been the stumbling block, two hundred and twelve miles, with a declivity of one hundred and thirty-two feet, or seven inches to the mile. It has got too much energy, it runs down hill too fast, and nature, in order to present a resistance to this steep declivity, has spread the river out wide, and every flood that comes along digs up new resistances in bars. We can not handle any such river for any large depth without taking out a part of this energy. That is fundamental. You can scratch it here and there and get eight or nine feet and maintain it for all time. You have got to change the nature of the stream. It has got too much ginger in it. You have got to treat it as you would a small boy, take some of the ginger out and then he will attend Sunday-school and mind his ma. (Laughter and applause.)*

We propose to do that by constructing two dams, one at Jefferson Barracks and one at Commerce, taking out a part of this declivity, and regulating the river on what is left, thus getting a deep channel. Nature automatically will do this. It will be produced quicker if assisted by man, and you will get a result, relatively speaking, such as there is from the Red River to the Gulf of Mexico, where we have a slope of one and a half inches to the mile carrying the entire drainage and all the washings of the Mississippi Valley, in a section one

hundred and fifty to two hundred feet deep, and one-third to one-half mile wide. That is the solution. (Applause.)

Incidentally you can convert the slope which you take out and which you concentrate in these dams into water power. I have estimated, as a preliminary step for fourteen feet, that we will have two hundred thousand horse-power at each site, which will pay a revenue on a valuation of four hundred dollars per horse-power. You can figure it up as a conservative proposition. When we have produced twenty-four feet, when we have treated the Upper Mississippi and some of the other tributaries on the basis of conservation, we will have eight hundred thousand horse-power at the two sites, or a million horse-power, according to how far you may regulate and equalize the flow of the stream. In other words, with this project rationally carried out, leaving to the rivers only that fall which is necessary to have the water run in a tractable course and one that you can control and maintain, you will take out eighty per cent of the fall between Chicago and Cairo, and convert it into water power.

Now you will notice here, and I should have called your attention to it on the longer profile from the Gulf of Mexico to the Gulf of Saint Lawrence—you will notice how relatively flat the Illinois valley is from Utica to Grafton, only a twenty-eight-foot fall, and that flat slope will extend to St. Louis when one of these dams is constructed. I have placed that dam provisionally at Jefferson Barracks. There is a question about the best site. Something has been said in the newspapers about this dam site. The foundation will be about seventy feet below low water, but if that tries anybody's nerve, if the Engineering Board don't see their way clear, they need not condemn the project, because they can place the dam at any other locality preferred. If you should see such a reason given in the report of the Board, you can recall Tom Reed's aphorism, "Reasons are what men invent to justify the things which they wish to do." (Applause.)

I started out all right, but went off on a side-track. I happened to think of that Board. I want to call renewed attention to that section between Utica and St. Louis. Between Chicago and St. Louis turns all the east and west transportation of this Continent.



Every railroad route that carries east or west passes through that throat. A few turn toward the Gulf. Here is this waterway, this place of low declivity, this continental land and water cross-roads, like the Bosphorus of old, the land and water crossing between two continents, that carried the flickering light of civilization through the dark ages, a thousand years of night. In my opinion, if we build this waterway on a proper scale, that will be the great assembling point along this water route between Chicago and St. Louis, and on these flat grades you can develop sites for industries right in the bread-basket of the Continent. With combined land and water transportation, the assembling of material will be cheaper than any place on earth, and ships can be produced cheaply and loaded with their cargoes, to be carried to the uttermost parts of the earth. (Applause.)

Exhibit Nos. 6 and 7 is a map and profile, which is not quite as long as what it purports to show. The map, on a scale of one inch to the mile, extends along the upper limits from Lockport to Utica and further, to the beginning of the Hennepin Canal. This map shows the route of that part of the waterway which is covered by the Constitutional Amendment of the State of Illinois.

Below it you have a profile on the scale of two and one-half inches to the mile, from the end of the Drainage Canal at Lockport, sixty-one miles, down to Utica. That shows correctly the elevations, shows five descents or dams at which it is proposed to build locks and produce water power. At the end of the Drainage Canal—see the profile here—above Joliet, is a drop of forty feet. At a distance of five miles and immediately below Joliet, is a drop of thirty-five feet. Sixteen to eighteen miles further down, below the mouth of the Kankakee and above Morris, you have a drop of twenty feet. In the vicinity of Ottawa you have another drop of twenty feet. At the head of the alluvial valley at Starved Rock, you have the final drop of thirty-one feet; the total of 146 feet. All schemes for the improvement of the Upper Illinois have these five drops and four pools that you see in the red on the profile. The channel is shown as it will be for fourteen feet, and for a large part of the distance it is deeper than twenty-four feet, and the twenty-four-foot

BELOW CHICAGO CITY DATUM IL

100

110

120

130

140

150

160

170 RI





LAKES-TO-THE-GULF DEEP WATERWAY ASSOCIATION,  
*Symon Clover* CONSULTING ENGINEER.  
**ULTIMATE WATER-POWER.**  
LAKE WATER, 14,000 S.F., LAND WATER BELOW KANKAKEE RIVER 333 S.F., BELOW FOX RIVER 667 S.F.  
SANITARY DISTRICT, LOCKPORT, 42,000 H.P.  
STATE, JOLIET, 44,000  
AUX SABLE, 25,000  
OTTAWA, 26,000  
STARVED ROCK, 36,000 131,000 H.P.  
EFFECTIVE HORSE-POWER ON TURBINE-SHAFT, TOTAL, 173,000.

**PROJECT.**  
**JOLIET LEVEL**  
CHANNEL 24 FT. DEEP & 400 FT. WIDE, BETWEEN DOCK WALLS  
**KANKAKEE, MORRIS AND OTTAWA LEVELS:**  
PRELIMINARY CHANNEL, 14 FEET DEEP & 230 FEET WIDE, ON BOTTOM.  
INCREASED CHANNEL, 19 FT. DEEP & 205 FT. WIDE ON BOTTOM.  
INCREASED CHANNEL, 24 FT. DEEP & 180 FT. WIDE ON BOTTOM.  
ULTIMATE CHANNEL 24 FEET DEEP & 360 FEET WIDE ON BOTTOM.  
**LOCKS.**  
24 FT. ON MITER SILLS, 110 FT. WIDE AND 1000 FT. LONG.

# The UPPER ILLINOIS RIVER

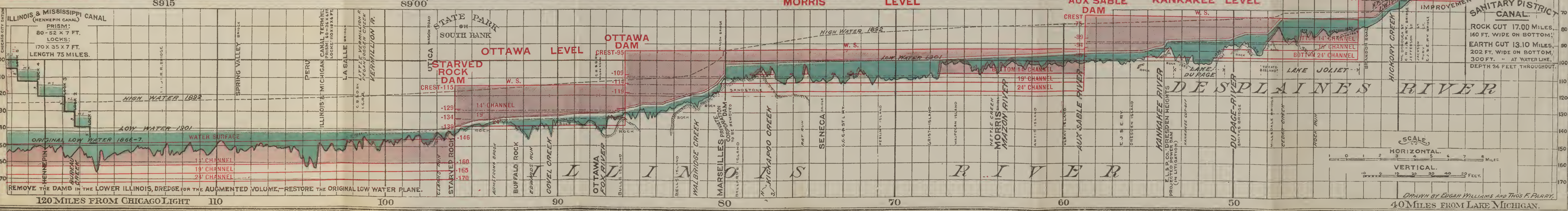
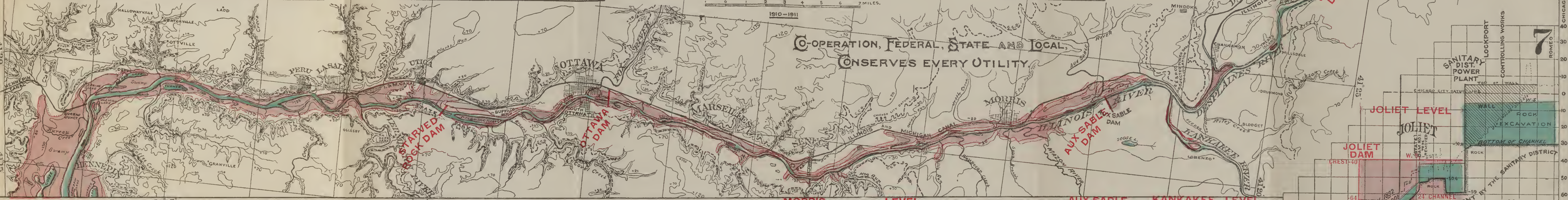
INCLUDING THE DESPLAINES.

## FROM JOLIET TO HENNEPIN.

PROJECT INTERPRETS WATERWAY AMENDMENT TO THE CONSTITUTION OF THE STATE OF ILLINOIS COVERING RIVER BETWEEN LOCKPORT AND UTICA.

**CONSTITUTIONAL AMENDMENT.**  
THE WATERWAY AMENDMENT BY UNANIMOUS VOTE IN EACH HOUSE OCT. 16, 1907; WAS SUBMITTED TO THE PEOPLE NOV. 3, 1908. AND WAS ADOPTED BY AN AFFIRMATIVE VOTE OF 692,522, AS AGAINST A NEGATIVE VOTE OF 195,177. IN A TOTAL VOTE OF 1,169,330.

CO-OPERATION, FEDERAL, STATE AND LOCAL,  
CONSERVES EVERY UTILITY.







line of depth can be seen also. It is estimated that the flow of water that will eventually come from Lake Michigan through the Chicago Drainage Canal, together with the natural flow of the river, will produce 173,000 horse-power, and with the revenue therefrom the State of Illinois proposes eventually to recoup itself for its expenditures and contribution to the deep waterway. I will not go into that at length.

A DELEGATE: Is there any question about the supply of water?

MR. COOLEY: The latest authority in regard to the outflow of the lakes above Niagara is that it averages two hundred and twenty-five thousand cubic feet of water per second. We propose to actually take out fourteen thousand cubic feet. The effect will be something, of course, because you can not take away something and have it all left. That is a proposition in mental arithmetic. We have taken the position that the effect is not material, and whatever it is it can be remedied for a very small fraction of our investment, and that the major premise here is, you are entitled to take it if you do not materially injure your neighbor. It rests entirely with the authority of Congress. The Lake Carriers' Association are the people who have stood guard on this question. The officers of that Association have assured me repeatedly that they were too broad to oppose the idea of a great waterway from the Lakes to the Gulf, and that when we are ready to act upon the matter and prepared to show them how the lake levels can be maintained, there will be no opposition from that quarter. (Applause.) I think that is absolutely correct. The only other opposition that I have heard of was developed by the hold-over Senator from the State of Michigan, and I believe his proposed colleague has something of the same objection. They very much fear that such a volume of water will so interfere with the currents of Lake Michigan as to destroy the peach crop on the east shore. That is one of the very grave questions which the U. S. Senate has delegated to the Board of Engineers to pass upon. They will pass upon the question of whether the peach crop of the east shore of Lake Michigan will be affected. I hope their other conclusions will be as favorable as their findings on that point. (Laughter.)

PRESIDENT KAVANAUGH: Someone asks you the question, What will you do with the sediment at Jefferson Barracks, if you dam the river at that point?

MR. COOLEY: There will not be any. That is a mistake. I don't wish to treat the question cavalierly, because it has been asked by the Board of Engineers itself by some very eminent engineers who have not thought of this matter, and by the Speaker of the House of Representatives. But I called attention to this proposition. We have the Mississippi River itself from the Red River to its mouth, with all the spoils of the Continent, without declivity and practically without current. At low water the tide runs up to Red River, three hundred miles, and the channel is deep, narrow and stable, the best part of the Mississippi River, with all that sediment going through. That is a pool held up by the Gulf of Mexico, an actual case. You can find such pools along the Missouri River, in any alluvial river, maintained between stable banks. The mistake is made, and it is a popular error, that the cussedness of rivers is due to the choking of the bed, but it is nothing of the kind—the choking of the bed is a phenomena of the excessive declivity of the river. Take the Missouri with an average declivity of ten inches to the mile, and it will have stable reaches, narrow and deep, on four inches to the mile, with the water running faster than on  $2\frac{1}{2}$  feet to the mile. Where it is spread out and divided, the velocities can be maintained. The velocity will not be decreased in this pool. At high water the velocities will be practically the same as before. Whatever is unnecessary for the proper limits of the stream will fill up. We want it to fill up. You simply reform the river on a lower grade, on a different horizon. It is a little difficult, I can see, to grasp this; but after an explanation to the committees of Congress and the Board of Engineers, they seemed to be satisfied.

Gentlemen, No. 8 is a map that shows the Middle Mississippi, from Grafton to Cairo, the portion which is considered the most difficult to handle of the entire route between the Lakes and the Gulf. It is the last refuge of the technical opposition to this project. You see there the general course of the river and the valley. It is a narrow valley, relatively speaking, compared to what we have above and



LA



89°20'

FEET  
ABOVE  
MEAN  
SEA  
LEVEL  
430

380

330

280

230

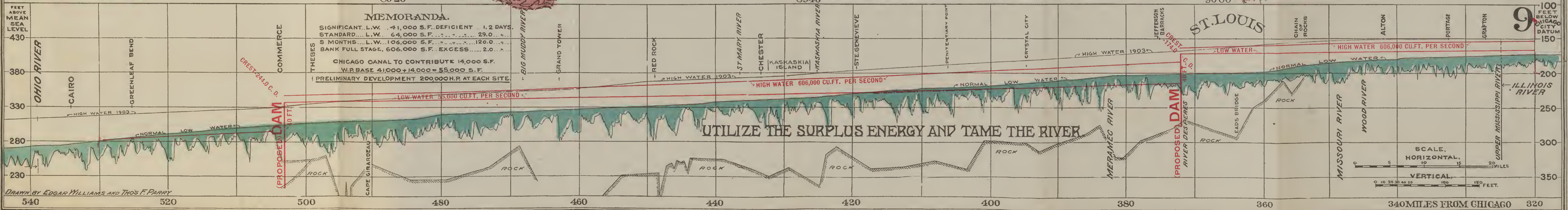
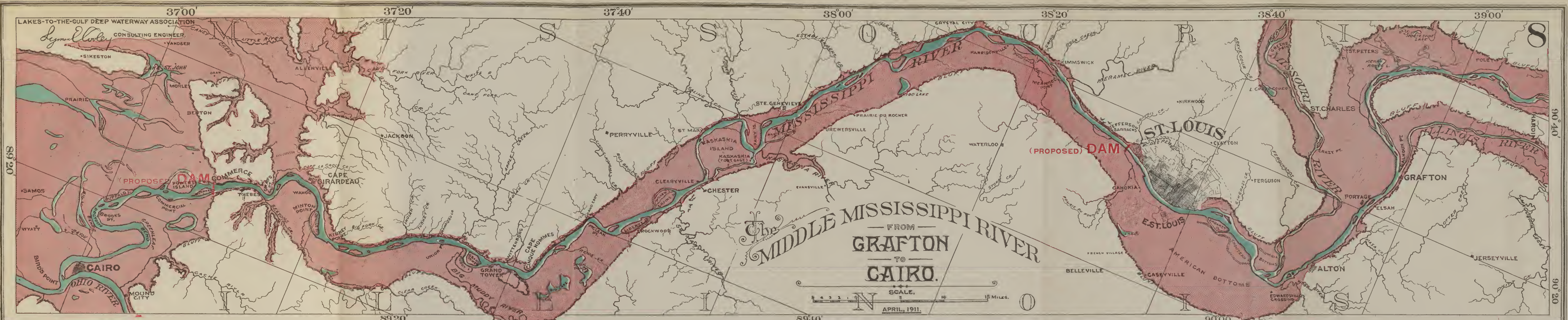
DRAMA















below. The great northern and western drainage here passes through the highlands, and there are no important tributaries. After the Missouri, the Mississippi and the Illinois have gathered together, they run nearly two hundred miles, and the valley then spreads out and receives the Ohio at Cairo. We have a steep declivity with high rocky bluffs. I have put a red band at the proposed site of a dam eight miles below the St. Louis bridge, and one proposed at Commerce, which are simply provisional as to sites. It will depend perhaps in some degree where rock is found at the best elevation and, in a large degree, on what location will produce the best harbor for St. Louis.

Exhibit No. 9 is a profile that covers the Middle Mississippi itself, which has to be discussed especially, and was prepared for the class of people who can only see the hole in the doughnut. It shows the declivities and all the high-water lines and the volumes corresponding to each line between Grafton and Cairo. It shows all the proposed sites of two dams, one eight miles below the St. Louis bridge and one at the foot of the gorge at Commerce, about thirty miles above Cairo. With the aid of these two dams we can regulate the Mississippi River so as to produce this fourteen feet as an initial development, and later twenty-four feet, thirty feet or any depth you want. It is a question of how much of a fall you will take out by the dams and how much you will leave to the river bed, as to what depth you will produce in the river bed. I don't propose to do this instantly, tomorrow; we will build the dams and when they are constructed a very moderate amount of work—that can be done in part while the dams are under construction—will give you a forty-foot fall at each dam and will give you two hundred thousand horse-power at each site, and enable you absolutely to control the flood limits. After the initial lowering of the river bed, the further development of the river is a matter which will go on automatically, and this can be hastened and directed whenever you feel the need of more water, and when you have resources to apply it—there is no limit if you design the original work properly. I don't think that it will cost any more to obtain this result of fourteen feet than to attempt it in some other way, and the advantage will be that you have subdued this stream



and put yourself in position to go on at a relatively moderate expense hereafter and get more depth whenever you feel like it. That is the situation.

The question has been raised by my friend in regard to the sediment. After the reformation of the river bed on a different horizon, with a more economical channel, narrower and deeper, there will be the question of overflow, and that has also been raised, but in this treatment it is proposed to handle these floods opposite and above St. Louis within the limits of the extreme natural floods. In other words, there should be no flood greater than that in 1844, and it will be perfectly practicable to build the dam in such a manner that it will be sufficient for such a flood as that of 1844. Every wise man and every municipality and every agency that has sought to protect itself, has built or is building protection work that will amply provide against the flood of 1844. There would be some immediate effect perhaps where the people are negligent and have not provided proper protection works. The dam will raise the ordinary water within fifteen feet of where it was in 1844 at St. Louis, but it will also control the entire fluctuations within that limit, and it makes it possible to have a harbor at St. Louis where you can have vertical docks, where you can load and unload your cargoes, as we do on the lakes or on the seaboard where the tide is not excessive.

Now, when you come down to Commerce we actually elevate the river there, we actually raise the water line there, about ten feet. We do accentuate the floods above the proposed structure up as far as Grand Tower, and to meet that condition we will have to construct extra high and strong embankments above those that would be required to protect against the natural conditions. That means some additional expense. There are about sixty thousand acres of land involved in that proposition, but all of that land has to be treated by levees in any event, if it is to be reclaimed. You simply treat for an accentuated condition, and when it is so treated it is as available as it would be without the dam.

Now, gentlemen, we have completed the nine exhibits. I have to beg your pardon for pursuing this matter, much as I did when I was a professor and lecturer to students, because I have made no

preparation to speak to you here today, and have only spoken as the exhibits suggested as we went along, and I am not in condition to speak, as I have a very bad cold.

I want your attention to one or two propositions, and perhaps others if they occur to me on the spur of the moment. We have been through in the last twenty years a revolution in engineering methods. The construction of the hydraulic dredge and the ability to handle material in large quantities in river beds for 3 to 5 cents per yard, and less under certain conditions, in place of four to twenty times that amount, and the construction of cement masonry which in the early canal days cost from eighteen to twenty-five dollars per yard, and today costs from four to eight dollars per yard—all these and other things have made possible the dreams of twenty years ago. What the next twenty years will produce, I don't know. I will bet something on it, and then I will refrain from setting my own mental limitations as a measure for the next fellow, which some people who criticise are in the habit of doing. They are unable to believe anything except what they themselves comprehend, and they imagine that that is the limitation on what the world is going to do. These men should be lawyers, who must have a precedent for everything, and judge the present and future by the past. It is different with the engineer. He is the man who brings things to pass. He takes back-sights, it is true, but only for the purpose of reversing his instrument for his fore-sights. We have engineers in my profession who look wise and who appeal to the judgment of men who see only the hole in the doughnut, who are unable to reverse their instruments, and who do not possess the faculty characterized by Tyndale as the scientific use of the imagination. (Great applause, long and continued.)

The engineer deals with the unprecedented and the unknown, but he determines his problems with the same certainty that the unknown point is fixed in location by two angles from a base line. In looking into the future the engineer who can not see beyond what has been done, does not deserve to be called an engineer—he is not an engineer. (Great applause.)



Now the thought I am coming to is this. We have talk about nine feet. It means absolutely nothing. (Tremendous applause.) I am not speaking on the question of whether it is useful or not, I am speaking on the physical side. It is just a little irritation (laughter) of the forces of nature which may be resented. You do not change the regimen of the stream. You undertake to pacify it in some degree, a little scratching of the sides and bottom if nature will permit.

Now, you can all bet on this as a safe proposition—that the water in the river and the depth thereof is not an accident. It means something in the cause of nature. Some engineers proceed on the theory that nature made a mistake of some kind and that all that is necessary to do is to get busy and do a little whittling and tickling, and all will be changed for the better. That is not true. You have got to change conditions to produce important results, and what you produce without changing the conditions is something uncertain and something requiring perpetual maintenance. That is the proposition that I want to put up to you.

Now, you are going to change the conditions, you are going to secure the banks below Cairo, you are not going to let nature run wild and fill up your channels and wallow through the crossings with hydraulic dredges every year. You are going to fix the banks and stop erosion. What are the facts? Between Cairo and Red River, a distance of seven hundred and sixty-four miles, there is cut from the banks, in the average year, one billion yards of material, one billion—a square mile and a thousand feet deep. That is what the river gnaws out and takes away. There does not come to the river at Cairo from the Ohio, the Missouri and Upper Mississippi over four hundred million yards—that is, 40 per cent of the billion yards produced locally in that stream. What goes out? Four hundred million yards go out annually into the Gulf of Mexico—not the identical stuff, but the equivalent of the stuff that passes Cairo. Say there are one hundred bends, each filling the crossing below, ten feet deep, for a couple of miles every year. You can not permanently increase the depth without controlling the stream—it is not possible, it is nonsense.

Now, you hold the banks, you reform the river. You stop this billion yards, take the task off the stream, and it takes care of itself. You produce fourteen to twenty feet, whatever comes from it.

Now I want to carry that thought out a little and then I will obey my boss. (President Kavanaugh had stated that the time is short.)

The proposition between St. Louis and Cairo has been pretty well thrashed out. The major proposition here is the surplus energy, and we are to get rid of as much of that as we can, that is, produce a type of river such as is habitual to one-half or one-third of the grade. We know by example and by calculation of characteristic sections of the river, what results will follow the change of declivity. There is no question about it.

Now, come to the Illinois River. We have the same proposition in a different form. The building of the dam below St. Louis will carry the gentle grade of the Illinois River from Utica right to the city of St. Louis, thirty feet of fall in two hundred and seventy miles. You can make any depth you please. I have estimated that in several ways, and we can produce at least twenty-four feet from Chicago to Peoria and a preliminary depth of eighteen to twenty feet thence to St. Louis—the first crack out of the box. It is a mere problem of dredging mud. The natural river has not enough energy, but you can produce that by a deep section which does not eat up the energy in friction, and from that deep section results an effective force which clears and maintains the stream. That is the general proposition for the lower Illinois River.

Now, above there—study that profile. I have shown the location of the five locks and dams. You have twenty-four feet of water to the Drainage Canal just as soon as you build the locks and deepen the smaller fraction of the distance.

I want to simply emphasize this proposition. Nine feet means nothing; nine feet is absolutely blighting to the situation in Illinois, makes it impossible. You can not carry the water nine feet that we must take out of Lake Michigan. We can not carry the water through the lower Illinois valley on nine feet. We can not carry a



third of it without endangering about four hundred thousand acres of bottom lands to a degree that is not to be contemplated. If we can not carry the water away we can not produce the water power. If we are to be held down to nine feet there is no need of any more water, and that kills the Chicago sanitary investment. We do not need to take any more out of Lake Michigan for nine feet—and I kind of suspect that that is the milk in the cocoanut. We lose out on the sanitary question, we lose out on the water-power question, we lose out on the waterway question, and we lose practically our whole investment in the State of Illinois (applause), and we have men in the State of Illinois who have not the wit to see it. (Laughter.) There is the whole proposition. The thing lies deeper than what you see on the surface.

Now, I want to emphasize this fact further that you have got to change things to produce results, and you can not subordinate your project to the conditions as they now exist. You must change them. I am not referring to politics. I leave that to the junior Senator from Illinois and Mr. Kavanaugh. I am referring to the conditions which God Almighty put in those streams.

And now a word to my friends, the *Illini*, the Indian word for "the men," and are we not Indians still?

The territory of Illinois had its northern boundary at a parallel touching the south end of Lake Michigan, and Chicago was then in the territory of Wisconsin. Nathaniel Pope was territorial delegate and persuaded the Congress to shift the boundary to the present northern limit, in order that Illinois should have a coast on the unsalted seas, and in order that the great water route should lie within the confines of a single State. At that time the right of the nation to improve or build waterways was denied or questioned. Pope argued that the new State would thus become the commercial bond of union between the basin of the Saint Lawrence and the basin of the Mississippi, and thus forever insure the perpetuation of the Confederacy.

Illinois as a new State, in 1818, thus became the trustee of a purpose as broad as the Union, the custodian of an endowment that



# BASIN OF THE GREAT LAKES ABOVE NIAGARA.

10

SCALE, 1911.  
50 100 150 STATUTE MILES

LAKE BASIN			
	U.S.	CANADA	TOTAL
LAKE SURFACE	56,257	31,638	87,895
WATER SHED	101,380	75,820	177,200
TOTAL IN BASIN	157,637	107,458	265,095
	SQ. MI.		

31,800 SQ. MI.  
LAKE SUPERIOR  
S.L.W. 601.3  
H.W. 605.35

22,400 SQ. MI.  
LAKE MICHIGAN  
S.L.W. 580.2  
H.W. 584.84

23,200 SQ. MI.  
LAKE HURON  
S.L.W. 580.2  
H.W. 584.84

10,000 SQ. MI.  
LAKE ERIE  
S.L.W. 571.95  
H.W. 575.9

CONSERVATION  
BEGINS IN THE USE OF THE  
NATURAL RESERVOIRS.

LAKE-TO-THE-GULF  
DEEP WATERWAY ASSOCIATION.  
Lyman & Cooley CONSULTING ENGINEER.

DRAWN BY THOS. A. PARRY



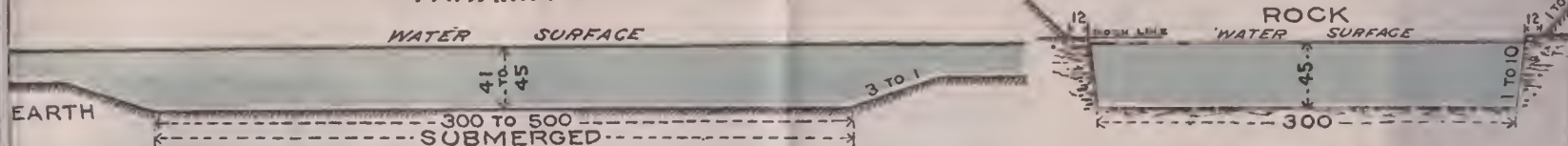


# CHARACTERISTIC CANAL SECTIONS.

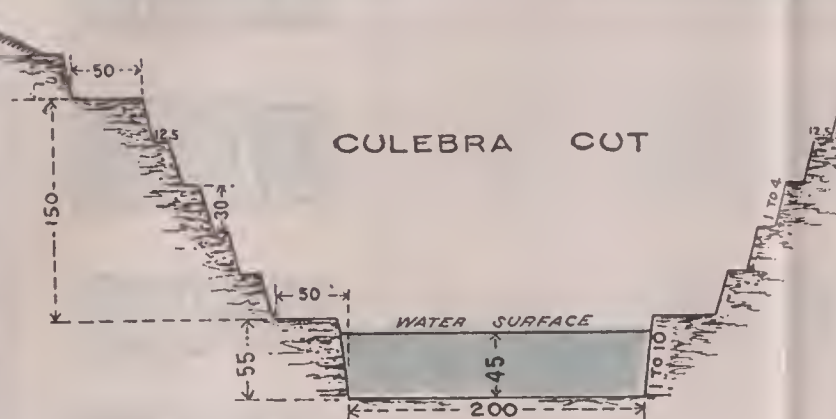
11

SCALE.  
100 80 60 40 20 0 100 200 300 FEET.  
1911.

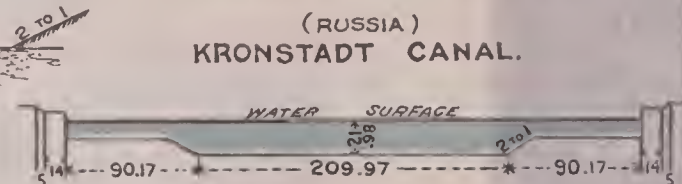
## PANAMA CANAL UNDER CONSTRUCTION BY U.S.



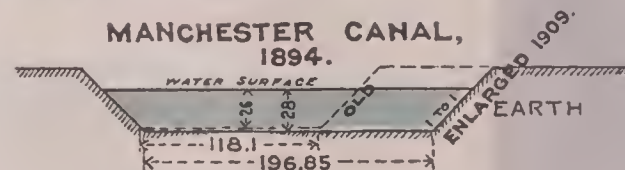
## CULEBRA CUT



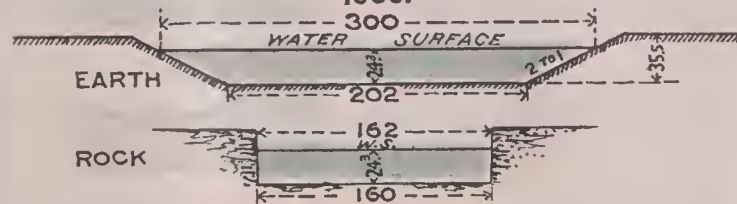
## (RUSSIA) KRONSTADT CANAL.



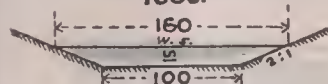
## MANCHESTER CANAL, 1894.



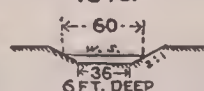
## CHICAGO SANITARY AND SHIP CANAL, 1900.



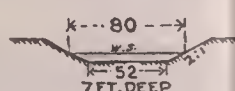
## (CANADIAN) WELLAND CANAL. 1886.



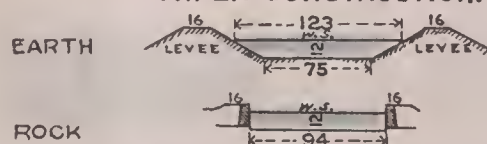
## ILLINOIS AND MICHIGAN CANAL. 1848.



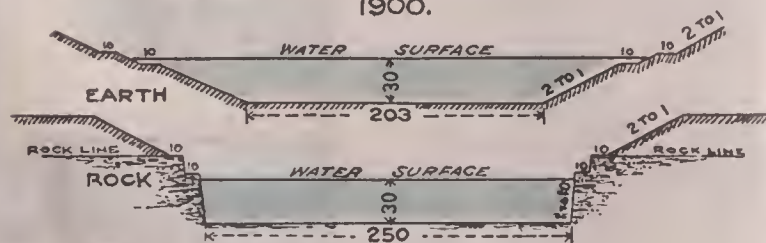
## (HENNEPIN) ILLINOIS AND MISSISSIPPI CANAL. 1907.



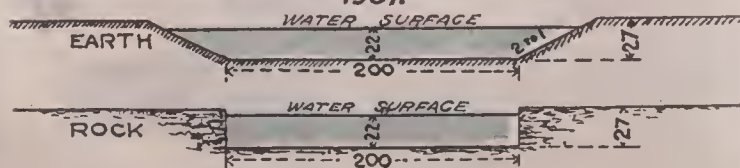
## NEW YORK STATE BARGE CANAL, UNDER CONSTRUCTION.



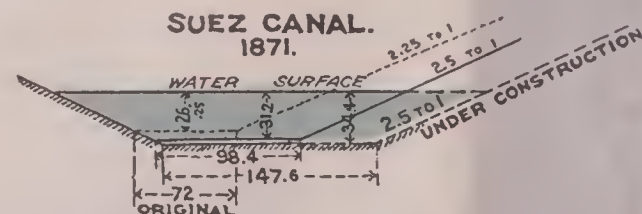
## LAKE ERIE TO THE ATLANTIC OCEAN. PROPOSED U.S. DEEP WATERWAY, 1900.



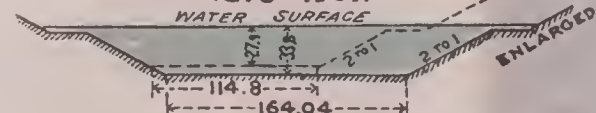
## (FRENCH, OTTAWA RIVER ROUTE.) PROPOSED GEORGIAN BAY SHIP CANAL, 1907.



## SUEZ CANAL. 1871.

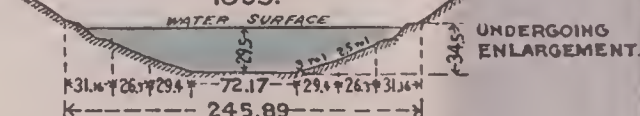


## AMSTERDAM CANAL, NORTH SEA. 1876-1907.

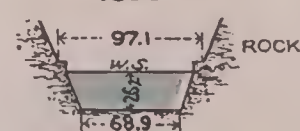


## "KIEL SEA CANAL." "NORTH SEA-BALTIC," GERMANY.

## KAISER WILHELM CANAL, 1895.



## (GREECE) CORINTH CANAL, 1893.



LAKES TO THE GULF  
DEEP WATERWAY ASSOCIATION.  
*Symon & Loeb* CONSULTING ENGINEER.

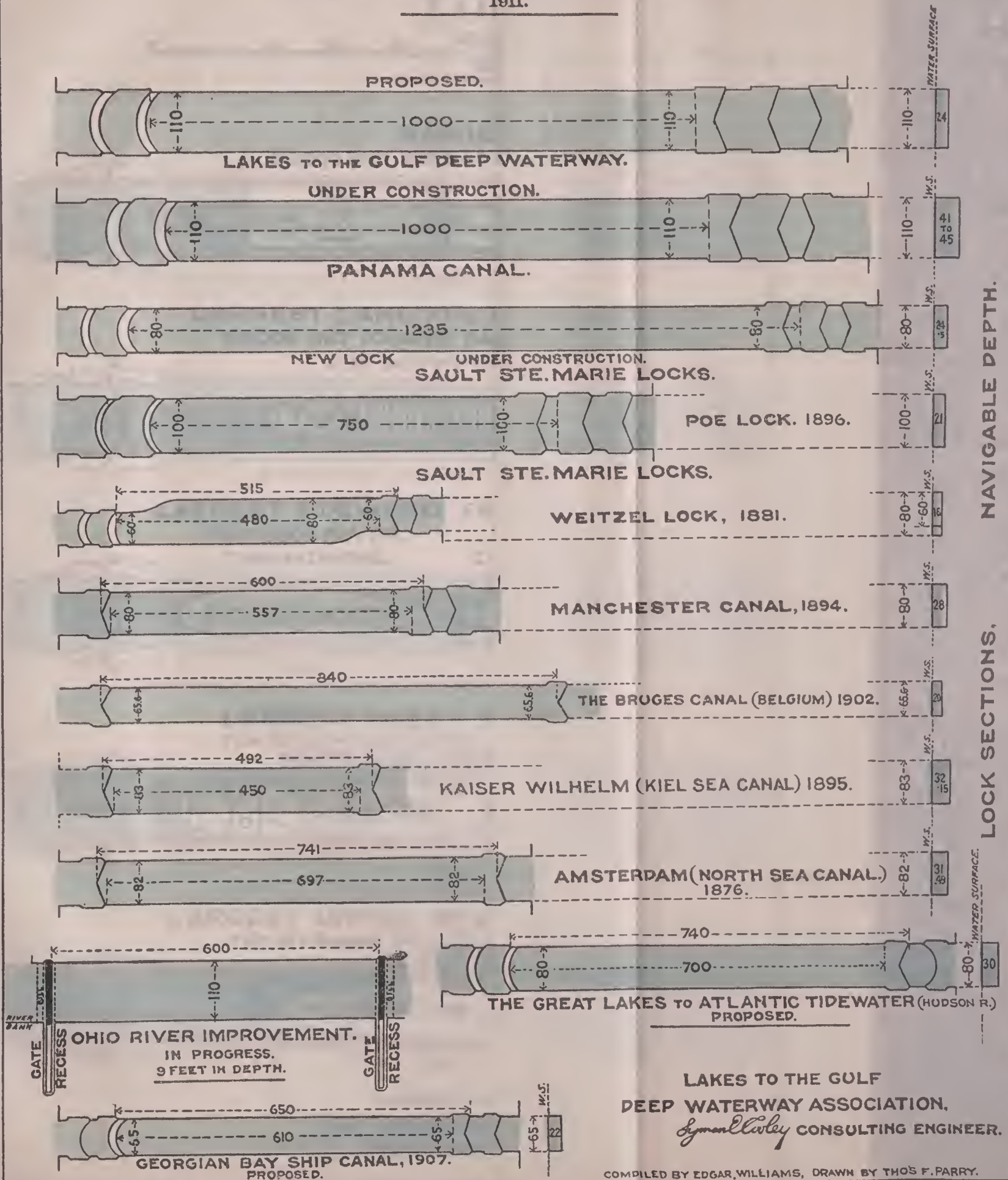
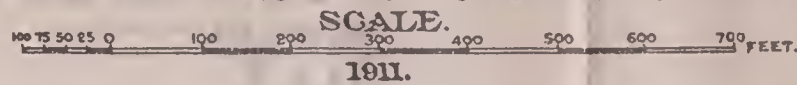


CHAMBERLAIN'S CANAL



# CHARACTERISTIC CANAL LOCKS.

12





## CHARALTBESTO (CAN)

154

Jihad Amman

1250748

OHIO RIVER IMPROVEMENT  
JANUARY 1911  
STATE OF OHIO

**RESEARCH**

# TYPES OF SHIPPING

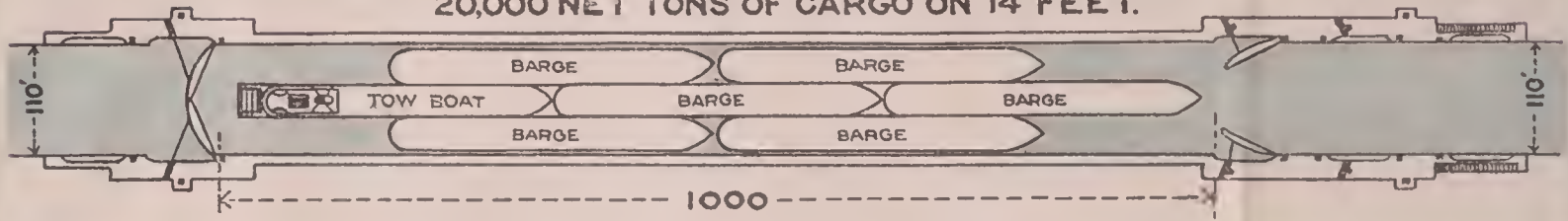
## IN PROPOSED

### LOCK.

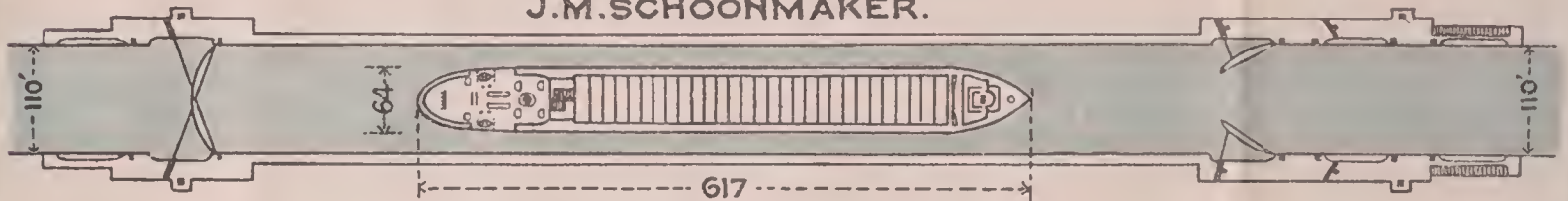
13

SCALE,  
1911.  
100 200 300 400 500 600 700 800 900 1000 FEET.

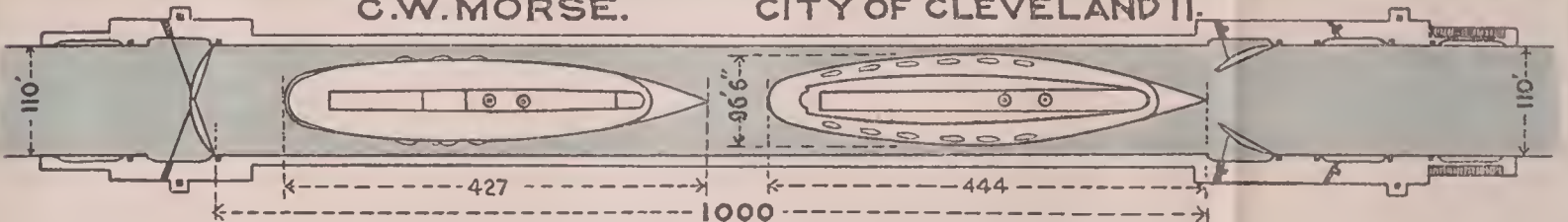
**BARGE TOW.**  
20,000 NET TONS OF CARGO ON 14 FEET.



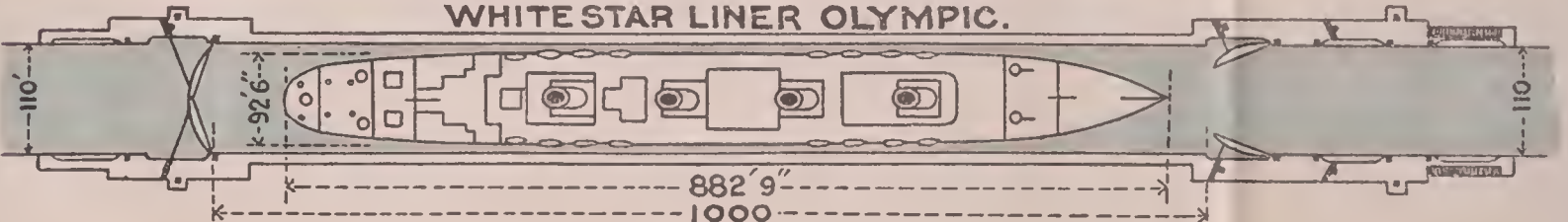
**LARGEST LAKE FREIGHT STEAMSHIP.**  
20,000 NET TONS OF CARGO ON 24 FEET.  
J.M.SCHOONMAKER.



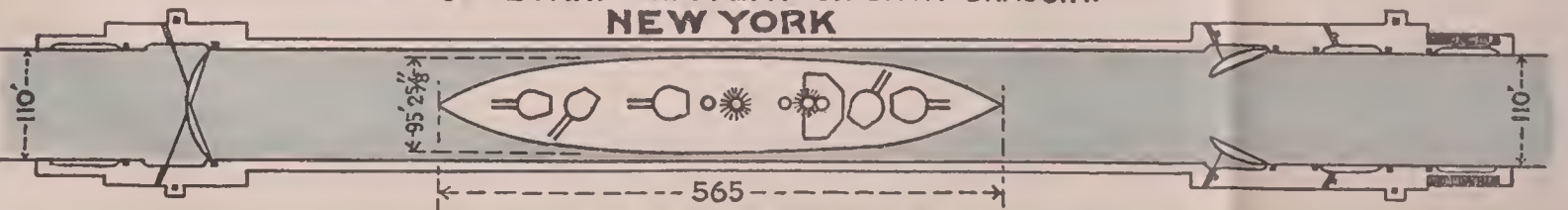
**LARGEST SIDEWHEEL PASSENGER STEAMERS.**  
HUDSON RIVER, C.W.MORSE. LAKE ERIE, CITY OF CLEVELAND II.



**LARGEST OCEAN STEAMSHIP.**  
FOR SEABOARD DELIVERY ON LIGHT DRAUGHT.  
WHITE STAR LINER OLYMPIC.



**LARGEST UNITED STATES BATTLESHIP**  
FOR SEABOARD DELIVERY ON LIGHT DRAUGHT.  
NEW YORK



LAKES TO THE GULF  
DEEP WATERWAY ASSOCIATION.

*Symant & Cooley* CONSULTING ENGINEER.

COMPILED BY EDGAR WILLIAMS, DRAWN BY THOS F. PARRY.



# TYPES OF SHIPPING

IN BRIGADES

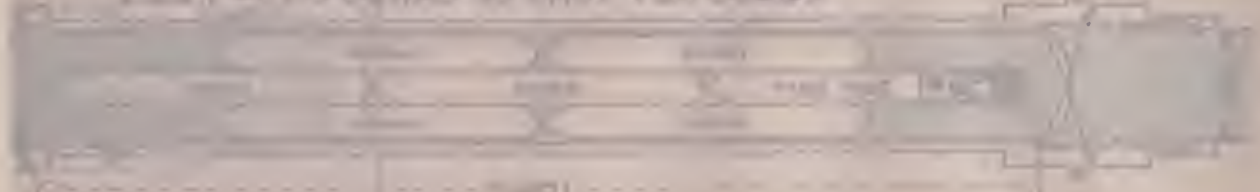
LOCK

SCALE

100

BARRE TOWN

5000 NET TONS OF CARGO ON 14 FEET



LARGEST LAKE FREIGHT STEAMSHIP

5000 NET TONS OF CARGO ON 14 FEET

J. M. SCHONHARTER

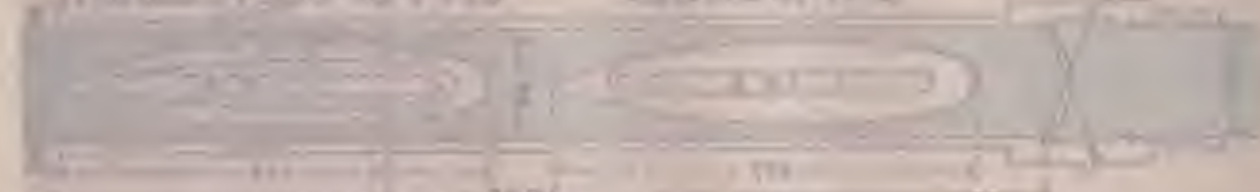


LARGEST SIDEWHEEL PASSENGER STEAMSHIP

HUGHES RIVER

LAKE ERIE

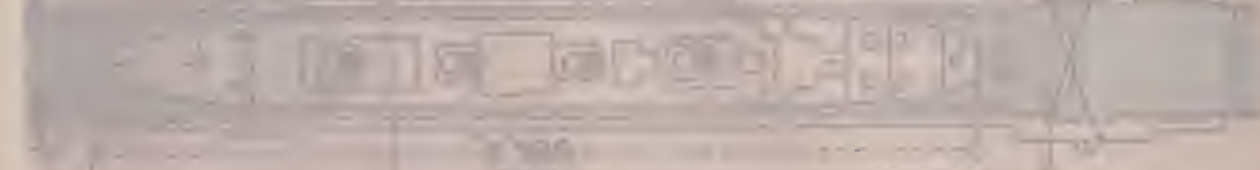
CITY OF CLEVELAND



LARGEST OCEAN STEAMSHIP

FOR ALL PURPOSES, DELIVERED IN LIGHT WEIGHT

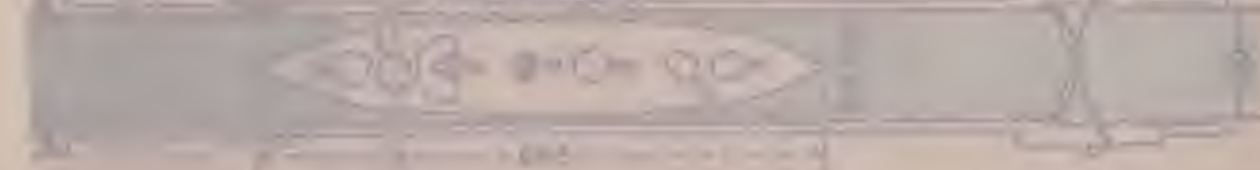
WHITE STAR LINE OCEANIC



LARGEST UNITED STATES BATTLESHIP

FOR STANDARD DELIVERY ON 1000 TONS

NEW YORK



LOOKING TO THE SOUTH

BEING WATERWAY ASSOCIATION

FOR THE PURPOSE OF

is singular and pertains to the entire Continent. There are men among us who do not sense their responsibilities, who would subordinate opportunity to mere expediency, who would convert our endowment into by-products, who would blight the fruition of the dreams of Nathaniel Pope and his confrères who endowed Illinois with a sacred trust.

Shall we swap our birthright for a mess of pottage?

At the conclusion of his address Mr. Cooley was given an ovation.





# What Presidents Have Said About Our Waterway.

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GEORGE WASHINGTON.

At the close of the Revolution, before going to Annapolis to resign his commission, in a letter to Marquis de Chastelleux, said in part:

"Prompted by these actual obstructions, I could not help taking a more contemplative and extensive view of the vast inland navigation of these United States, and could not but be struck with the immense diffusion and importance of it; and with the goodness of that Providence which has dealt his favors to us with so profuse a hand. Would to God we may have wisdom enough to improve them."

GEORGE WASHINGTON.

In a letter to William Irvine, October 31, 1788:

"The extensive inland navigation with which this country abounds, and the easy communications which many of the rivers afford with the amazing territory to the westward of us, will certainly be productive of infinite advantage to the Atlantic States, if the Legislatures of those through which they pass have liberality and public spirit enough to improve them."

THOMAS JEFFERSON

Seems to have been one of the first Presidents officially to express views on the subject of internal improvements. In his eighth annual message, November 8, 1808, in speaking of the surplus revenues, he said: "Shall it lie unproductive in the public vaults? Shall the revenue be reduced? Or shall it not rather be appropriated to the improvements of roads, canals, rivers, education, and other great foundations of prosperity and union under the powers which Congress may already possess or such amendment of the Constitution as may be approved by the State?"



JOHN QUINCY ADAMS.

In his fourth annual message on December 2, 1828, President Adams announced as one of the cardinal policies of the Government "the preliminary to great and lasting works of public improvements in the surveys of roads, examination for the course of canals, and labors for the removal of the obstructions of rivers and harbors, first commenced by the Act of Congress of April 30, 1824." Six days later he submitted to the Senate a report from the Secretary of War concerning the practicability and probable cost of building a breakwater at the mouth of the Mississippi.

PRESIDENT JOHN TYLER,

On June 11, 1844, in vetoing a river and harbor bill, which in the parlance of today would be termed "pork barrel" bill, with much satisfaction called attention to the fact that he had approved a bill for the improvement of the Mississippi River and its chief tributaries, and certain harbors on the Lakes. The Mississippi, he said, belongs to no particular State or States, but is reserved as a great common highway of the commerce of the whole country, and therefore may properly be improved at the expense of the whole country.

JOHN C. CALHOUN.

Speech delivered at Memphis when he presided over the convention for waterway improvement held in 1845:

"I believe the free and uninterrupted navigation of these inland seas is within the peculiar province of the General Government."

ABRAHAM LINCOLN.

"The driving of a pirate from the track of commerce in the broad ocean and the removing of a snag from its more narrow path in the Mississippi River can not, I think, be distinguished in principle. Each is done to save life and property, and to use the waterways for the purposes of promoting commerce. \* \* \* The most general object I can think of would be the improvement of the Mississippi River and its tributaries."

ABRAHAM LINCOLN,

In speaking of the argument of collecting tonnage duties so that rivers and harbors can be improved, answered the arguments raised now by persons not favorable to the Lakes-to-the-Gulf Deep Waterway project who declare that commerce does not demand it. President Lincoln said: "We shall never make a canal by tonnage duties until it shall already have been made awhile so the tonnage can come into it."

PRESIDENT ANDREW JOHNSON,

In his second annual message, December 3, 1866, made the following reference to the country's greatest river, the Mississippi:

"As a subject upon which depends an immense amount of the production and commerce of the country, I recommend to Congress such legislation as may be necessary for the preservation of the levees of the Mississippi River. It is a matter of national importance that early steps should be taken, not only to add to the efficiency of these barriers against destructive inundations, but for the removal of all obstructions to the free and safe navigation of that great channel of trade and commerce."

PRESIDENT RUTHERFORD B. HAYES.

In the third annual message of President Hayes, December 1, 1879, the only mention of inland waterway improvements was that of the South Pass of the Mississippi River, under contract with James B. Eads, of which he spoke in an optimistic vein. He said that the payment of a total of \$4,250,000 for work done had accomplished an increased depth in four years of from seven and one-half feet to twenty-six feet and a minimum width of two hundred feet.

PRESIDENT RUTHERFORD B. HAYES,

In his fourth annual message, December 6, 1880, called attention to the importance of the improvement of the Mississippi River in these forceful words: "A comprehensive improvement of the Mississippi and its tributaries is a matter of transcendent importance. These great waterways comprise a system of inland transportation



spread like network over a large portion of the United States, and navigable to the extent of many thousands of miles. Producers and consumers alike have a common interest in such unequalled facilities for cheap transportation. Geographically, commercially and practically, they are the strongest tie between the various sections of the country. These channels of communication and interchange are the property of the nation. Its jurisdiction is paramount over their waters, and the plainest principles of public interest require their intelligent and careful supervision, with a view to their protection, improvement, and the enforcement of their usefulness."

PRESIDENT JAMES A. GARFIELD,

In his inaugural message, March 4, 1881, said: "Our facilities for transportation should be promoted by the continued improvement of our harbors and great interior waterways."

PRESIDENT CHESTER A. ARTHUR,

In his first annual message on December 6, 1881, said: "I advise appropriations for such internal improvements as the wisdom of Congress may deem to be of public importance. The necessity of improving the navigation of the Mississippi River justifies a special allusion to that subject. I suggest the adoption of some measure for the removal of obstructions which now impede the navigation of that great channel of commerce."

This was followed by a special message on April 17, 1882, directing attention to the accompanying recommendation of the Mississippi River Commission. Referring to the object sought, he said: "The constitutionality of a law making appropriations in aid of these objects can not be questioned. The safe and convenient navigation of the Mississippi is a matter of concern to all sections of the country; but to the Northwest, with its immense harvests, needing cheap transportation to the sea, and to the inhabitants of the river valley, whose lives and property depend upon the proper construction of the safeguards which protect them from the floods, it is of vital importance that a well-matured and comprehensive plan

for improvement should be put into operation with as little delay as possible.

"It may not be inopportune to mention that this Government has imposed and collected some \$70,000,000 by a tax on cotton, in the production of which the population of the Lower Mississippi is largely engaged, and it does not seem inequitable to return a portion of this tax to those who contributed it, particularly as such action will also result in an important gain to the country at large, and especially so to the great and rich States of the Northwest and the Mississippi Valley."

#### PRESIDENT GROVER CLEVELAND.

On January 18, 1897, Mr. Cleveland transmitted to Congress the report of Messrs. James B. Angell, of Michigan; John E. Russell, of Massachusetts, and Lyman E. Cooley, of Illinois, who were appointed Commissioners to make inquiry and report, after conference with such similar Commissioners as might be appointed on behalf of Great Britain or Canada, concerning the feasibility of the construction of such canals as would enable vessels engaged in ocean commerce to pass between the Great Lakes and the Atlantic Ocean.

In his message of transmittal Mr. Cleveland said: "The advantages of direct and unbroken water transportation of the products of our Western States and Territories from convenient points of shipment to our seaboard ports are plainly palpable. The report of the Commissioners contains, in my opinion, demonstration of the feasibility of securing such transportation, and gives ground for the anticipation that better and more uninterrupted commerce, through the plan suggested, between the great West and foreign ports, with the increase of national prosperity which must follow in its train, will not long escape American enterprise and activity." Since this report was made the Canadians addressed themselves seriously to the subject and have quietly accomplished a Lakes-to-the-Gulf Deep Waterway by the Saint Lawrence River to the Gulf of Saint Lawrence.



The foregoing indicates the views held by the Presidents preceding the Roosevelt Administration on the subject of the improvement of our waterways so far as their views were expressed officially.

Public sentiment for the preservation and improvement of our waterways found its highest expression in the utterances of President Roosevelt.

Theodore Roosevelt was the first President to conceive and advocate a comprehensive, permanent waterway policy for the improvement of the nation's rivers and harbors; he was wise enough to see that only by adopting a fixed policy which will remove the subject from the mutations incidental to our form of government can we achieve the priceless and lasting benefits of water transportation approximating those brought about by the consistent policies of European governments.

With rare prescience he showed the country the necessity of improving its waterways, roused us from the apathy with which we have regarded the subject, and crystallized into definite form the vague and inharmonious views with which it was contemplated.

#### PRESIDENT ROOSEVELT,

In his speech in St. Louis, October 11, 1910, in discussing the waterway question with President Kavanaugh, of the Lakes-to-the Gulf Deep Waterway Association, said: "It was largely because of this organization that I began to take a keen interest in the project.

"The waterway problem is of interest and importance to every part of the country, here in the Mississippi Valley especially. Here, if you start to improve navigation, you begin with a great bay, and you end with the great inland ocean of the lakes.

"We are absolutely certain, ultimately, to improve the Mississippi. The problem is one which must be considered by the best experts. It is vital that it should be done right. I am certain that it will be done.

"In Europe I was impressed with the communications by water. They cheapen from 3 to 4 and 6 per cent the cost of transportation on all bulky freight. We've got to shape the boats for the waterway as well as the waterway for the boats."

PRESIDENT ROOSEVELT,

At the Conservation Congress in St. Paul, September 6, 1910, said:

"One of the greatest of our conservation problems is the wise and prompt development and use of the waterways of this nation. The Twin Cities, lying as they do at the head-waters of the Mississippi, are not upon the direct line of the proposed Lakes-to-the-Gulf Deep Waterway. Yet they are deeply interested in its prompt completion, as well as in the deepening and regulation of the Mississippi to the mouth of the Missouri and to the Gulf. The project for a great trunk waterway, an arm of the sea, extending from the Gulf of Mexico to the Great Lakes, should not be abandoned.

"The Lakes-to-the-Gulf Deep Waterway, and the development of the rivers which flow into it, should be pushed to completion vigorously and without delay.

"No man can foresee the limit of the possibilities of development in the Mississippi Valley. Such being the case, and this Valley being literally the heart of the United States, all that concerns its welfare must concern likewise the whole country; therefore, the Mississippi River and its tributaries ought by all means to be utilized to their utmost possibility. Facility of cheap transportation is an essential in our modern civilization and we can not afford any longer to neglect the great highways which nature has provided for us. These natural highways, the waterways, can never be monopolized by any corporation. They belong to all the people and it is in the power of no one to take them away. \* \* \* The Mississippi should be made a loop of the sea and work upon it should be begun at the earliest possible moment. \* \* \* Adequate funds should be provided by bond issue, if necessary, and the work should be delayed no longer."



WILLIAM H. TAFT.

In a speech before the Lakes-to-the-Gulf Deep Waterway Convention in Chicago, 1908, when then a candidate for the presidency, said: "The question of the systematic improvement of our inland waterways is one which our Government has all too long neglected. And so it is that after the first century of our existence, we find our inland waterways, with few notable exceptions, unprepared for the uses of transportation, but the consideration of their permanent and extensive improvement according to some general and comprehensive plan so as to mould them into a complete system of transportation, has now forced this upon us with surprising suddenness.

"We find that the enormous increase in the productions of our people in all lines of industrial activity has outstripped the ability of our great railroad systems, extensive and efficient as they are, to transport them. We find that during the ten years ending with 1905, the internal commerce of our country has increased 118 per cent, while railroad transportation facilities during the same time have increased only 20 per cent. It has been pointed out that to supply this deficiency by the construction of additional railroads and necessary terminals, would require a capital investment of \$5,300,000,000, and this construction, when completed, would make no provision for the further increase of our commerce. Shall we have a repetition of the experience of three years ago, when the farmer saw his grain wasting in the field and the manufacturer stopped his plant for want of raw material, and our finished products lay in the warehouse, all for lack of facilities to transport them?

"A commodity, raw or finished, is of little or no value until it has reached the place of its use. We can not stop now in our onward course of utilizing the natural resources of our country. We can not curtail or limit the production of our manufacturers. We must go on, for a contrary course means disintegration and decay. Transportation, then, is the question of the hour. How can we solve it? We must have recourse to our waterways.

"No nation has been favored with so magnificent a system of navigable lakes and rivers, reaching in their providential distribu-

tion every section of the great valley lying between our east and west mountain ranges and of the slopes from these to their respective coasts. If we improve these in accordance with a well defined, progressive policy we shall, in conjunction with our great railroads and other forms of transportation, keep pace with the industrial and commercial advancement of our country.

"I am not unmindful of the great expenditure of public money which the prosecution of such a policy will entail. The expense of carrying an article from the place where it is to the place where it is wanted, must be added to its cost, whether it be in its raw or finished state. Therefore its cheaper carriage results in a saving to that extent. As transportation by water is about one-sixth of that by rail, a great saving apportioned between the producer and consumer, and hence among all our people, would follow.

"My own judgment is that every great improvement like that of the Lakes-to-the-Gulf channel should be treated by itself as one of great enterprise, and that provision should be made by bonds or otherwise.

"Your project proposes to connect by a deep waterway the Great Lakes system with the Mississippi River and the Gulf of Mexico, and thus with all the harbors of the world. It is a grand conception, and appeals to the thoughtful consideration of those who must finally pass upon its adoption. The Mississippi River, with its great tributaries, drains an empire vastly greater in all the resources of nature than those who accomplished the acquisition of that mighty stream and the territory beyond it."

WILLIAM H. TAFT,

In a letter to Governor Charles S. Deneen, of Illinois, April 17, 1911, said: "The project for a navigable waterway from Lake Michigan to the mouth of the Illinois River and thence via the Mississippi to the Gulf of Mexico, is one of national importance and commands my sympathy."



## DANIEL WEBSTER.

Extracts from a speech delivered by Daniel Webster, December 2, 1846, to merchants and other citizens of Philadelphia:

"Let us contemplate for a moment the Mississippi. This noble and extraordinary stream, with seven or eight millions of people on its banks, and on the water falling into it, absolutely calls for harbors, for clearing out rivers, for the removal of snags, and other obstacles to safe navigation. Who is to do this? Will any one of the States do it? Can all the States do it? Is it the duty appropriate of any State, or any number of States? No, no, we know it is not. We know that unless this government be placed in the hands of men who feel that it is their constitutional authority and duty to make these improvements, they will never be made, and the waters of the Mississippi will roll over snags, and snags, and snags for a century to come.

"These improvements must come from the Government of the United States, or in the nature of things they can not come at all; and I say that every steamboat that is lost by one of these snags, every life that is sacrificed, goes to make up a great account against this government. Why, what a world is there! What rivers and what cities on their banks! Cincinnati, New Orleans, St. Louis, Louisville, Natchez and others that spring up while we are talking about them, or, indeed before we begin to speak of them, commercial marts, great places for exchange of commodities along these rivers, which are so many inland seas, as it were."

Wheeler's History of Congress, pages 406-407, Vol. 2.

## DANIEL WEBSTER.

Extract from address by Daniel Webster to the citizens of Pittsburg, July, 1833:

"The East is old, pretty fully peopled, and small. The West is new, vast and thinly peopled. Our rivers can be measured, yours can not. We are bounded, you are boundless. The West was, therefore, most deeply interested in this system, though certainly not alone interested even in such works as had a Western locality.

To clear her rivers was to clear them for the commerce of the whole country; to construct harbors, and clear entrances to existing harbors, whether on the Gulf of Mexico or on the lakes, was for the advantage of that whole commerce, and if this were not so, he is a poor public man whose patriotism is governed by the cardinal points, who is for or against a proposed measure according to its indications by compass or as it may happen to tend further from, or come nearer, to his own immediate connections. And look at the West! Look at those rivers—look at the lakes—look especially at Lake Erie, and see what a moderate expenditure has done for the safety of human life and the preservation of property in the navigation of the lake, and done, let me add, in the face of a fixed and ardent opposition.”

Wheeler's History of Congress, page 405, Vol. 2.

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## THE CHICAGO PLATFORM, 1908.

### REPUBLICAN.

In the Chicago platform the planks declaring for the conservation of the natural resources and in favor of the improved waterways are grouped together, and are expressed in these words:

“We indorse the movement inaugurated by the administration for the conservation of natural resources; we approve all measures to prevent the waste of timber; we commend the work now going on for the reclamation of arid lands and reaffirm the Republican policy of the free distribution of the available areas of the public domain to the landless settler. No obligation of the future is more insistent, and none will result in greater blessings to posterity. In line with this splendid undertaking is the further duty, equally imperative, to enter upon a systematic improvement, upon a large and comprehensive plan, just to all portions of the country, of the waterways, harbors and Great Lakes, whose natural adaptability to the increasing traffic of the land is one of the greatest gifts of a benign Providence.”



## THE DENVER PLATFORM, 1908.

## DEMOCRATIC.

With the assembling of the convention at Denver, the question of waterways and their improvement was presented, by its own force of merit, as it was at Chicago—the question in both conventions being one without political tinge—and the delegates at Denver incorporated the following plank in their platform, with the unanimity that had prevailed at Chicago, the plank relating to the conservation of the natural resources being separate and distinct from the waterways plank, which is as follows:

“Water furnishes the cheapest means of transportation, and the National Government, having control of the navigable waters, should improve them to their fullest capacity. We earnestly favor the immediate adoption of a liberal and comprehensive plan for improving every watercourse in the Union which is justified by the needs of commerce, and, to secure that end, we favor, when practicable, the connection of the Great Lakes with the navigable rivers and with the Gulf through the Mississippi River, and the navigable rivers with each other, and the rivers, bays and sounds of our coasts with each other by artificial canals, with a view to perfecting a system of inland waterways to be navigated by vessels of standard draught.

“We favor the co-ordination of the various services of the government connected with waterways in one service, for the purpose of aiding in the completion of such system of inland waterways; and we favor the creation of a fund ample for continuous work, which shall be conducted under the direction of a commission of experts, to be authorized by law.”

# Commercial Highways to the Ocean

BY HON. O. P. AUSTIN,

CHIEF OF THE BUREAU OF STATISTICS, DEPARTMENT  
OF COMMERCE AND LABOR

The subject of improved commercial highways from our interior to the seaboard through deeper waterways from the Lakes-to-the-Gulf appeals to me mainly because the Mississippi Valley is a greater distributor to the requirements of man than any other similar temperate zone area of the world.

The importance of more and better highways to the ocean, despite the network of 240,000 miles of railway co-operating with our rivers and lakes as carriers of our commerce, becomes apparent when certain conditions now obtaining in the commercial world are considered. I call your especial attention to three facts having an important relation to the question, the proper solution of which your Convention is seeking to find: First, the enormous increase in facilities for ocean transport during recent years; second, the wonderful expansion of international commerce, now aggregating more than thirty billion dollars a year, which has come as a result of better facilities for ocean transportation; and, third, the rapid development of production and producing power in the Mississippi Valley, thereby intensifying the need of adequate facilities for the prompt and economical transfer of its merchandise from the place of production to the ocean, that great international highway already well supplied with commerce carriers.

Carrying power on the ocean is now twenty-five times as much as at the beginning of last century and has actually doubled in less than twenty years; while the world's great railway system has been created within the memory of men now living. As a result of this enormous increase in the carrying power, many articles formerly not considered as possible subjects of international commerce are now passing from continent to continent and country to country in enormous quantities, and the international commerce of the world is twenty times as much as in 1800, and has doubled in the last twenty-five years.



Meantime, the producing power of the United States and her contributions to international commerce (most of which must be carried on the ocean) have enormously increased. Within the last twenty years our production of wheat and corn has increased 50 per cent; that of cotton has doubled; that of coal has trebled, and that of iron and steel, and copper, and petroleum, has more than quadrupled, and the value of manufactures exported has grown from \$150,000,000 to \$750,000,000.

This increase in production has occurred chiefly in the interior of our country. The center of population, which at the beginning of last century was within a short distance of Baltimore, has moved steadily westward almost to the Mississippi. The center of manufactures has moved, since 1850, from the vicinity of Harrisburg, Pa., to Central Ohio in 1900; the centers of production of corn, and oats, and cotton, and coal, and iron, are almost upon the banks of the Mississippi, while the centers of wheat production and of farm area are now hundreds of miles west of that stream. What wonder, then, in view of the fact that the centers of population, of manufactures, of manufacturers' materials, and of the principal food supplies, have all moved westward until they have reached the very heart of this great country, that the question of the facilities for transporting these articles to the ocean steamship lines which wait to carry them to the commercial world, is demanding renewed consideration at this time.

But, say the objectors to this demand for increased transportation facilities, the United States has already the best and largest railway system of the world, and therefore does not need to expend vast sums upon its waterways to add to the carrying facilities already so abundant. Let us see about that. We do not want, any of us, to decry our railway system, of which we are justly proud; but there are various ways by which the availability of a railway system, however great and elaborate, may be tested. It is true that our railroads show a much greater length in total number of miles than those of any other country, and a greater mileage per capita than in most countries; that their cars are larger in capacity, and the cost of transportation per ton per mile less than in most of the

other countries of the world. But does that prove that our railroads are sufficient to conduct the transportation business of so large a number of busy people distributed over so large an area as that of the United States? Let us see how our facilities in this particular compare with those of certain other countries, countries which, by the way, have found it advisable to, in recent years, develop their waterways for use in conjunction with the railways. The length of railways in the United States for each 1,000 square miles of territory is, speaking in round terms, 60 miles; in Germany, 165 miles; in France, 140 miles; in the Netherlands, 164 miles; in Austria-Hungary, 101 miles; in the United Kingdom, 189 miles, and in Belgium, 398 miles for each 1,000 square miles of territory. Thus, in all of these European countries which I have mentioned—Germany, France, the United Kingdom, Austria-Hungary, Belgium and Netherlands—the number of miles of railway for each 1,000 square miles of area is much greater than in the United States—in most cases from 100 to 200 per cent in excess of our own. Yet every one of these countries, with possibly one exception (the United Kingdom), have seen fit in recent years to expend large sums of money in constructing and maintaining canals, canalizing rivers, and otherwise developing water-carrying facilities for use in conjunction with their liberal supply of railways, which far exceed our own when considered from the proper standpoint of the relation of length of line to the area which it is to serve.

The United States has become the world's greatest producer of cotton, of corn, of wheat, of coal, of iron, of steel, of copper, of manufactures. These are produced in the far interior of our great country, and must be sent to the ocean for transportation to the world's markets. To transport them to the ocean we must have ample carrying facilities. Why, then, ought we not follow the examples of our most successful commercial rivals, who have developed and are still developing their waterways for use in conjunctions with railway systems twice or thrice as great as our own in proportion to the area which they serve? They are our successful rivals in the great commercial world, and their success has been due, in no inconsiderable degree, to the elaborate transportation facilities supplied for the interchange of commodities among



themselves or for the transportation to the seaboard and thence to other parts of the world of that class of merchandise which confronts our manufacturers when they attempt to enter the markets of the world.

The next great question which arises is whether this condition, by which the interior of our country has become a great producing area, is to continue, and whether we shall, as the decades and centuries pass, continue to be the world's foremost purveyor of articles of international commerce, and thus require the continued services of great highways to the ocean.

North America has between its great mountain ranges at the east and west the greatest and most productive drainage basin of any of the continents, and that that basin is more advantageously located as to soils, rainfall, climatic conditions, and transportation facilities, natural and artificial, than any other of like extent in any part of the world. That area lies chiefly within the section of North America which we call the United States, most of which is occupied by this great Mississippi Valley.

Once a submerged continent, with those elevated ranges which we now call the Appalachian and the Rocky Mountains rising as inlands above that prehistoric ocean, with its chief area the bed of that ocean, the marine deposits of centuries, of ages, gave to its bed the basis of a soil containing the important requirements of plant life. Then, when the subsidence of the ocean, or the elevation of the lands, or both, brought that former ocean bed above the water, and the action of the elements in disintegrating the rocks gave it a soil able to produce vegetation, nature did other things to add to its supply of soil and soil material, and thus its permanent producing power. The great ice cap which at that later period covered the part of North America which we now call Canada, pushed its glaciers southward into the northern half of the glacial front, extending from New England, Western New York and Pennsylvania among the Ohio and Mississippi Valleys following nearly the present line of the Mississippi River, and down the Pacific Coast, bringing into that section from the far North the soil and the rocks which its very action ground into the elements to form

additional soil, thus giving to the northern half of our great country an abnormally rich and deep soil. At the south, that arm of the ocean which we call the Gulf of Mexico then extended much farther north than at present, covering with water that area which we now call the lower valley of the Mississippi as far northward as the junction of the Ohio, and the basis of a rich soil thus supplied was further enriched, as the Gulf receded, by the washings from the mountains and hills and valleys at either side.

Thus we find in a large share of our area an unusually—shall I say abnormally?—favorable condition of soil, a soil almost inexhaustible in depth, in richness, and in producing capacity.

But there are other things which nature has done and is still doing for this country. A rich and deep soil is of little value without a water supply, and this important requisite of productivity—or life, in fact—nature has given us, not in unbounded quantities (for in some sections of the world the supply is so excessive as to retard rather than favor agricultural utilization), but with such adjustment to requirements of temperate zone life as to assure regularity, and thus reliability, in the power of production of the great requirements of man—food and clothing.

The reliability of rainfall is largely due, especially in the Mississippi Valley, to natural conditions which must continue to exist as long as the earth revolves to the east and the present relation of land and water bodies obtains. The rapid revolution of the earth toward the east, more rapid than that of the air which surrounds it, causes a steady westward flow of air over its surface, especially in the vicinity of the equator, where climatic conditions compel a rapid evaporation of the water at the surface of the ocean. This current of air, passing over the Atlantic in the vicinity of the equator where the intense heat causes great evaporation, reaches the Gulf charged with moisture and, deflected northward up the valley of the Mississippi, and cooling as it rises and moves northward, precipitates its precious burden of moisture in the form of rains, rendering reliably fruitful the abnormally rich soil which other conditions of Nature have given to this valley.



We have here a great land mass with ranges of mountains on either side, and lying between them a great valley. Its waters at the extreme north flow into Hudson Bay at the east and in the lake region into the Atlantic, at the west to the Pacific, while in great area west and south of the lakes, and between the mountain ranges, they flow to the Gulf, the large proportion of them concentrating in the center of the valley. All this great intermontane valley of the Mississippi, as large as all Europe except Russia, once the bed of the ocean and later enriched at the north by the glacial period, has an unusually rich soil. It has, also, a temperate zone climate, capable of affording great production, and, what is equally important, giving vitality and energy to its inhabitants. It has an unusually reliable rainfall, especially in the eastern half, through the presence of air currents which bring the moisture from the Atlantic and Gulf and when cooled discharge it in the form of rain. We shall see that the area of this continent supplied with an equable rainfall in conjunction with a temperate zone climate is far greater than that found in any other of the continents. Lastly, its rivers, which have a greater navigable length than those of any other grand division, flow by gentle gradient into the ocean, while in many other parts of the world the rivers flow into land-locked seas or through such steep and rocky passageways as they approach the sea, as to reduce their value for purposes of navigation. \* \* \*

The chief producing section of this great country lies in the central valley, and this requires highways to the ocean. Of the acreage in farms in the entire United States, 70 per cent is found in the area lying between the Alleghenies at the east and the Rockies at the west; of the value of farm property, 69 per cent; of the wheat produced in the United States, 76 per cent; of the live stock, 72 per cent; of the corn, 85 per cent; of the food animals—cattle, 74 per cent; sheep, 52 per cent, and hogs, 81 per cent; of the wool, 55 per cent; of the cotton, 70 per cent; of the iron ore, 69 per cent; of the lumber, 47 per cent; of the petroleum, 69 per cent; and of the coal for turning these articles into form fit for use or for transporting them to the consumer, 60 per cent of the bituminous and 50 per cent of the total product of the country. All of these, be it remembered, are produced at points so located, geographically, as to be susceptible

of *transportation at easy grade* toward the Lakes or the Mississippi River, and thence by water to the ocean. So favorable are the natural conditions of this great interior valley that the facilities for assembling these natural products at almost any given point for manufacturing or other preparation for use are, to say the least, not merely exceptional, but unequaled in any other country of the world. What wonder, then, that the share which the great interior valley supplies of the manufactures of the United States has grown from 27 per cent in 1870 to 30 per cent in 1880, 35 per cent in 1890, and 38 per cent in 1905? What wonder that the wealth of that valley has grown from nine billion dollars in 1870 to fifty billions in 1904, and that the proportion which its wealth forms of the total of the country has grown from 37 per cent in 1870 to 47 per cent in 1904? What wonder that the interior valley contains 52 per cent of the population of the continental United States and that its people expended in 1907 \$150,000,000 for public schools, or 52 per cent of the total public expenditure of the United States?

Now, just a word about the future. I have shown you that the great interior of our country, that section which must have highways to the ocean, has at the present time a large share—more than half in every instance—of our great factors of industrial activity, international commerce, and general prosperity. Will this condition continue? Will this valley continue to supply not only its share of these principal products of the United States, but continue to contribute a surplus to the requirement of the world? To this, I think, we may unhesitatingly answer, yes. The estimated coal supply of the United States is over 3,000,000,000,000 tons, and of this enormous deposit, 83 per cent, according to the statement of those preparing this estimate, lies between the Alleghenies and the Rocky Mountains. Of the petroleum area of the country, 54 per cent lies within this valley; of the acreage in farms, 70 per cent is already in that valley, and we may assume that nearly all of the lands likely to be added to the farming area lie within this section. Of the iron, the copper, the wool and the cotton areas of the country, so large a proportion lies within that valley that it will continue to increase rather than decrease its share in the manufacturing output of the country, and that it will continue to contribute not only to the wants of our



growing population, but furnish for many years, for generations, a generous surplus for other parts of the world. It is not improbable that as the years pass the proportion of our food supply which we can spare for exportation will somewhat diminish, but we may confidently expect that the proportion of our manufacturing material which we turn into the finished form before sending it to other parts of the world, will greatly increase.

All this means that while we shall still increase our exportation, manufactures will form an increasing share of our exports. The world appreciates the value of our manufactures, it accepts them readily, *if offered in a form suited to the local wants of the consumer*. We have the world's greatest supply of the natural materials, and of the coal with which to turn them into the finished form; and it is within the power of this country to continue to be the *world's greatest workshop* as well as the world's greatest purveyor of *natural products*, but we must have plentiful and cheap transportation with which to assemble the raw materials and transport the finished product to the ocean.

Now, as to foreign markets and the facilities for reaching them: The whole civilized world is now a market. With the world-wide growth of transportation facilities on land and water, of great steamships which penetrate to every continent and island, and of railways which carry the products to the interior—every country, every island, every community, every home, has become a market for the products, whether natural or manufactured, of *any* industrious people willing to put forth the energy to produce these articles in the *form required by those various markets* and send them to the doors of those willing customers. And in this particular, *of transportation to other parts of the world*, nature has *again* given to us exceptional opportunities, while the art of man is also preparing an additional contribution to those natural facilities, in the form of the Panama Canal, which will permit our products to pass direct to the west and south, as they now do to the east. At the very point at which the products of this valley touch the Gulf or the Atlantic, they find another great current of water, the Gulf Stream, a river in the ocean, ready to lend its aid in transporting them to the greatest

market of the world, Europe. Its flow toward the east and north is more rapid than that of the Mississippi River, averaging from 50 to 100 miles per day, and it thus adds materially to the ease and swiftness of the transportation of our products, from the moment they reach the waters of the Gulf until they are well on their way to the markets of Europe. Another great stream, the Pacific Equatorial Current, not so swift, but of much greater length, passes the very door of that artificial waterway which our government is now cutting through the Isthmus of Panama. It flows steadily from near the western end of the proposed Panama Canal straight across the Pacific Ocean past our Hawaiian and Philippine Islands to the coast of that other great market of the world, Asia, with a regular, even flow, averaging perhaps twenty-five miles per day, thus adding to this extent to the facilities of transportation toward the Orient. Its northward deflection along the eastern coast of Asia and return flow across the North Pacific to our own coast also gives to our vessels the aid of favorable currents on the return trip, thus increasing the speed of the vessel movements in the entire trip from the Panama Canal to the Asiatic shores and the return by way of the North Pacific and our western coast.

Still another advantage which the merchandise of this valley will have on the opening of the canal will be found in the markets of Western Latin-American and our own Pacific Coast.

The markets of Europe, measured by their imports in the latest available year, amounted to \$10,000,000,000; those of Asia to which a new and direct route will shortly be open, \$2,000,000,000; those of the western coasts of the North and South American Continents, \$250,000,000. To those of Europe we have already direct access, but our opportunities there will advance as we increase the facilities of cheap transportation from the great interior to the ocean.

Low freight rates are of especial importance in these days when business is conducted on small margins of profit; for, say what you may of the great business combinations, and the high prices, which are chiefly the result of dear raw materials and well-paid labor, the world's business is being conducted on a constantly reducing margin of profit. Cheap transportation is, then, an absolute requisite to



the success of the great industrial and commercial country, and water routes properly developed and maintained, operated in harmonious relation with other transportation systems, do give these cheap rates.

The price of transporting wheat by rail over the 1,000 miles of railway between Chicago and New York has averaged ten cents per bushel during the past seven years. During the same seven-year period the price of transporting wheat across the Atlantic from New York to Liverpool, a distance of 3,000 miles, has averaged three cents per bushel, or one cent per bushel for each 1,000 miles, using round terms in all these statements. *On the railways ten cents per bushel* for 1,000 miles; on the ocean, *one cent* per bushel for 1,000 miles. And, remember, that these railway rates were made with a dozen transportation systems competing for the business—via Canada, via the Great Lakes, via the half dozen railway lines to the east, and by the various lines which reach tide water on the Gulf of Mexico.

Another striking illustration of the cheapness of water transportation is found by comparing freight rates on the Great Lakes with those on the railways of the country. The ton-mile rates received on all the railways of the country averaged, in 1906, .77 of 1 cent per mile. The government reports of the business passing through the Sault Ste. Marie Canal, connecting Lake Superior with Lakes Huron and Michigan, and which carries a traffic more than twice as great as does the Suez Canal, shows the average cost of carriage .80 of 1 *mill* per ton-mile. The average receipts per mile on the railways in 1906 were .77 of 1 cent per mile, or nine and one-half times as much on the railways as on the Lakes.

I do not assert that these figures are absolutely comparable. In case of wheat rates from Chicago to New York, and New York to Liverpool, the land haul is but 1,000 miles and the ocean haul 3,000 miles. In the case of the Sault Ste. Marie Canal the articles carried are chiefly the great staples more easily handled and occupying little space, such as wheat, flour, iron ore, copper, lumber and coal; and the average distance which they are carried greater than that of the miscellaneous freight handled on all the railroads of the country.

But the great contrast in rates, the fact that railways on an average carry practically ten times as much per ton per mile as do the water carriers, justifies the general assertion that water carriers can, and *do*, give a much cheaper service than the railways. *The country which can project* an arm of the ocean through the land to its very center, as a ship canal to the Great Lakes would do, will add enormously to its industrial and commercial possibilities.

What, then, is the one thing lacking to make the great interior valley the greatest commercial and industrial section of all the world? Deep-water transportation from the Great Lakes to the Atlantic and Gulf. Is this thing possible? Yes. Is it feasible? Yes. Look again at the map of North America. A ship canal across Southern Michigan and another from the eastern end of the Lakes to the Atlantic would enable ships which load at the lake cities to pass direct to the Atlantic and thence across the ocean to Europe. A ship canal from the Lakes to the South would enable other ships which load at the Lake ports to move southward and, entering the Gulf, pass thence through the Panama Canal, to the Pacific Ocean, to the western coast of all America, and to the eastern coast of all Asia, and return laden with the products of the Orient.

Do you ask me again is it feasible? For answer I point you to the work now in progress on the Isthmus of Panama. Who can doubt that a nation which is building, in a tropical climate, a canal capable of carrying the world's largest ships over a great mountain range would, when this is finished, be able and willing to build another which should carry other ocean vessels to the heart of her greatest producing section, the greatest producing area of the world, especially when Nature has done so much to aid this work, as is the case in the Mississippi Valley or in the Lake region?





















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